TOOLING & PRODUCTION Magazine

NOVEMBER 1958

Thoughts on Automation's Impact 14
by Chester S. Johns

TOOLING & PRODUCTION's Talk of the Month.

Pending Patent Articles 51
by E. Willard Pennington

Surface Finishes: Carbide vs. Oxide 53
by Leonard A. Sowinski

Machineability lab tests of production-type operations show when carbides perform best . . . and when ceramic tools are preferred . . . depending on the desired results.

An Efficient Screw Machine Department 57

Good layout and good equipment point to a winning production combination, and Dictaphone's new department has just that.

Mechanized Assembly of Transistors 59
by Richard C. Shafer

Minute components, rigid spacing requirements, and rapidly changing specs used to mean manual assembly. Not now, with this intriguing setup.

Licking the Tough Ones — Cold Extrusion . . . 62

Hunter Douglas finds a good way to work corrosion- and high temperature-resistant metals.

'Egg-Crate' Sampling: Ups Production & Downs Costs 64

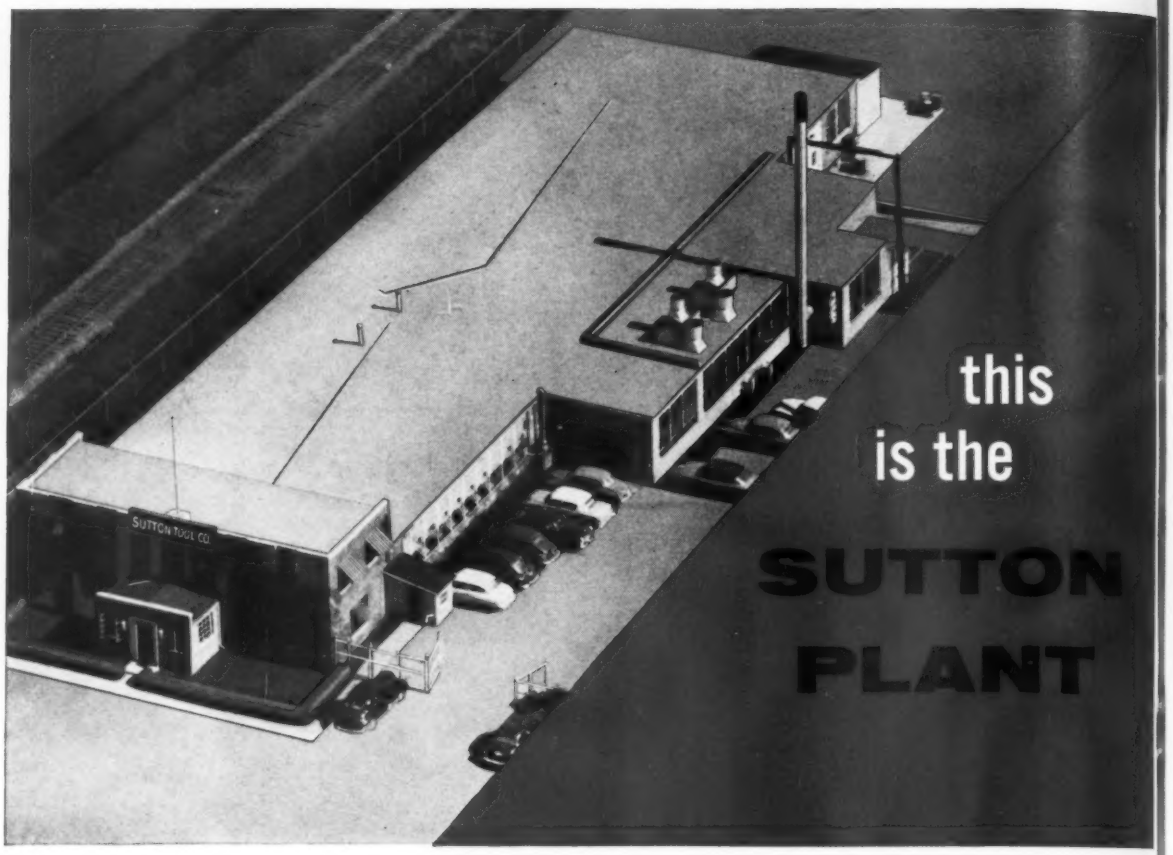
Lets machine operators run a continuous quality check to pinpoint rejects as they are produced.

Parts from the Solid 67

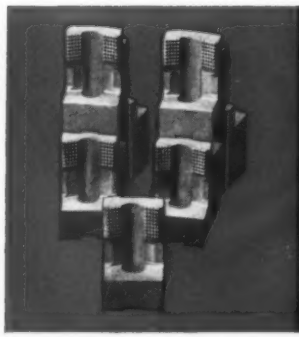
A combination of plunge grinding, electrical discharge and ultrasonic machining, and match grinding shape hardened parts "from the solid."

Flaring Tool Resists Wear . . 33
Bushings Pressed Into Cylinders . 37
Tracer-Controlled Lathe Turns Railroad Car Wheels . . . 39
Salvages Castings for $50 . . 46
New Machines for Grooving, Boring 49
Inch Thread Measuring System Studied 56
Test Bomber Landing Gears on Machine Tool Ways? . . . 66
Device Predicts Forming Limits . 70
Two Brakes Used As One . . . 74
Mass Production for Automation 74
Shaper Firmly 'Friction Mounted' 77
Pallet-less Transfer Machine . . 77
15" Spindle Unit with Fast Setup 78
Hard-Surfaced Pump Sleeves . 79
Scarfing Tool Ups Production . 79
New High Production Tapper . 80
Liquid Sealant Locks Pipe Plugs . 80
Cylinders Assemble "To Suit" . 82
Steel Cuts Treating Costs . . . 82
Battery of Low-Run Machines . 82
Dialing Simplifies Short Run Work 83
Small Boring Machine Economically Tooled for Rugged Job . . 85
Unique Straddle Milling Job . . 85
Unit Combines Drilling & Boring 140

Departments in This Issue:
Book Reviews 12
Men You Should Know . . 26
New Calling Cards . . . 38
Manufacturing Memos . . 40
Management Aids . . . 86
What's New In Plastics . . 90
Products & Processes . . . 92
Machining 102
Toolroom 116
Grinding & Finishing . . 119
Q-C and Inspection . . 123
Pressworking 126
Pneumatics & Hydraulics 130
Assembly 134
Cumulative Editorial Index . 136



Where SPECIAL TOOLS and ALL KINDS OF WORK-HOLDING DEVICES ARE MANUFACTURED!



These chuck jaws are one example of the many work-holding devices designed and manufactured or manufactured to customer design by Sutton! Check Sutton ability to make, deliver and price such items as these:

- Standard and Special Chuck Jaws
- Expanding Mandrels
- Gear Hobbing Arbors
- Special Arbors of All Types
- Special Collets
- Special Collet Chucks (Air and Hydraulically Operated)
- Special Diaphragm Chucks to Customer Designs

• Milling Machine Adapters • Special Adapters for All Machines • Special Boring Bars • Extension Tap Spindles • Special Machine Spindles • Special Screw Machine Spools and Bushings • Special Tool Blocks and Tool Holders • Special Cutter Heads • Special Mill and Drill Sleeves • Many Other Unusual Designed Tools

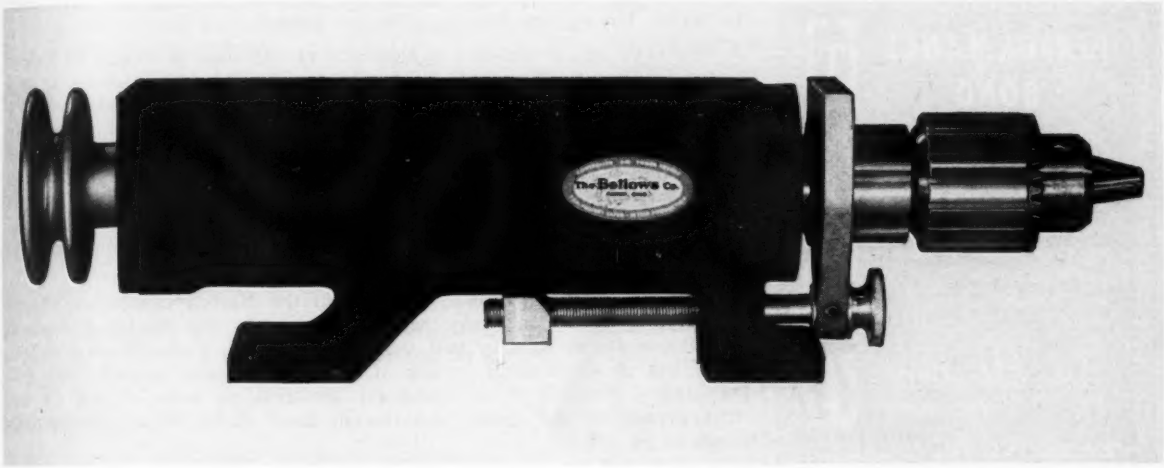
Write for Tool Bulletin No. 70

SUTTON TOOL CO. — Dept. TP-11 — Phone 1194 — Sturgis, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 2

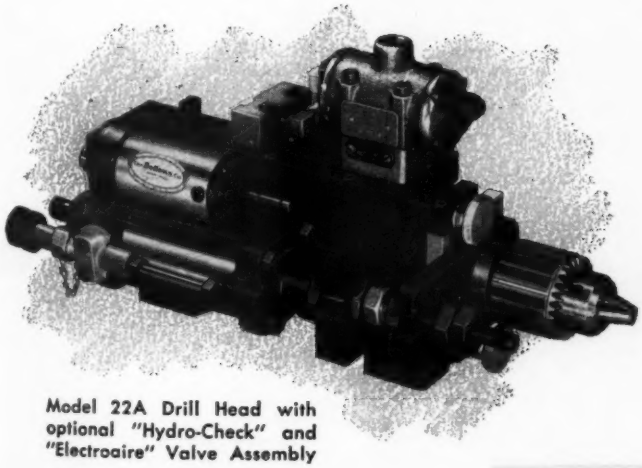
CHEAPEST WAY YET TO DRILL HOLES

*New Air-powered Bellows-Locke Drill Head Sells for only $95.00**



Not much bigger than a carton of cigarettes, the Bellows-Locke Model 22A Drill Head is the low cost answer for many machining operations in the softer metals, plastics and wood. Drill capacity in mild steel from No. 80 to 3/16″ diameter drill. 2″ stroke. Thrust two times air line pressure. Adjustable positive stop. Can be controlled by any standard four way air valve. Available also (at extra cost) with a built-in Bellows Electroaire Valve and hydraulic feed control.

**As illustrated less chuck and pulley.*



Model 22A Drill Head with optional "Hydro-Check" and "Electroaire" Valve Assembly

Write for Bulletin BL-22. Address The Bellows Co., Akron 9, Ohio, Dept. TP-1158. In Canada: Bellows Pneumatic Devices of Canada, Ltd., Toronto 18.

1196-B

The Bellows Co.
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION
AKRON 9, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 3

PRODUCTION PROTECTION

. . . use the only DIAMOND WHEELS with the PRESSURE-LOK®

PERFORMANCE BOND

THIS WHEEL IS A PRECISE DUPLICATION OF YOUR SPECIFICATION. WARRANTEED WHEN PROPERLY OPERATED, TO GIVE YOU THE LOWEST COST PER CUT OF ANY WHEEL.

PRESIDENT

THE PROPER BOND IS NECESSARY

To reduce carbide cutting costs to a minimum, every Diamond particle must constantly have sharp angular faces exposed to the work piece. Pressure-lok bond controls each abrasive grain just as long as facets of that Diamond present sharp cutting edges. Pressure-lok uses uniformly graded Diamond (no fines) of warranteed density in the world's finest bond.

be SURE . . . get PRESSURELOK®

HERE'S WHY PRESSURELOK WORKS BEST

Pressurelok is the best of Diamond Wheels because it scientifically combines warranteed amounts of graded Diamonds distributed in constant density throughout a perfect bond which wears uniformly at the ideal rate of Diamond wear.

REMEMBER: *We've Never Failed To Deliver.*

US UNITED STATES DIAMOND WHEEL CO.

835 ILLINOIS AVENUE AURORA, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 4

TOOLING & PRODUCTION Magazine

NOVEMBER 1958
VOL. XXIV No. 8
GEORGE J. HUEBNER, Founder

PERSONALLY SPEAKING

Dear T&P Reader:

There is much evidence that the business recession which set-in in mid-year 1957 has run its course. Many lines that were affected are now beginning to feel recovery. We've seen nothing that points to a quick return to the levels of 1956 and early 1957, but warnings we have seen to watch buying we think should be heeded.

A few days ago, I had the opportunity of spending a couple of hours one evening with Russell A. Reed who has headed up abrasives advertising for The Norton Company for many years. The automobile industry came in for a passing mention on the basis that while it is a relatively small part of our total overall economy, it represents an enormous factor in dollars nevertheless. An interesting measure of this was mentioned by Russ when he commented that a rule of thumb figure for them is that the building of each automobile wears out about four grinding wheels. That's an awful lot of grinding wheels they don't sell when automobile production is down one or two million units.

I was very interested also to learn about the Norton Company's ability to supply products you may need. For example, the Norton Cleveland warehouse stocks over a half million grinding wheels. This is a big stock but if all industry orders at once it can melt rapidly and you might find yourself in a back-order situation, so what I said in the first paragraph still goes even though local stocks of Norton wheels seem to be ample.

Recently I had the privilege of attending the first of a series of seminars on plastic tooling being conducted by Ren Plastics, Inc. The progress in this field is tremendous. The folks at Ren have made the use of their materials easy and exact by packaging them in such a way that nothing is left to guess work in the mixing of them. The versatility of plastics for many jigs and fixtures as well as for molds, patterns and prototypes, has been well proved in the last five to ten years. The progress has been largely as the result of the development of Epoxy resins. You would do well to look into the applicability of plastics tooling in your plant. Ren Plastics is running this series of seminars over the next several months. If you want to sit in on one, a letter to Gene Wiard of Ren Plastics, Inc., Lansing, Michigan, I'm sure would get you an invitation to the one nearest you. Also, the company has recently produced a manual on plastic tooling which sells for $3.50 per copy, and might easily be worth many, many times that price to your company.

Cordially yours,

Ray Huebner

Publisher

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Take a Critical Look

at the design of your Gear Shaving Machines

In today's competitive economy, it is imperative to scrutinize each production machine from the standpoint of operating costs. Just what does it contribute? What does it cost to operate? How does its design affect its operating economy? These questions suggest other more specific questions in the case of gear shaving machines:

CHIPS

- Are the cutters of your machines so located that chips fall away from them rather than into them?

LOADING HAZARD

- If, while loading, a work gear accidentally slips from the operator's fingers will it fall into the cutter teeth?

GRAVITY

- Is cutting pressure applied downward, taking advantage of gravity or upward, unpredictably taking up the operating clearance of the table ways?

AUTOMATION

- Are the extra components needed to automate the machine, in the way when the cutter is changed?

RIGIDITY

- Does the single solid cast column provide more rigidity than one made up of bolted sections?
- Is a deep massive table assembly held in position by gravity more rigid than a shallower, lighter assembly hung from above?

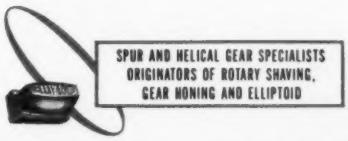
OBSTACLES

- Are there any projections above table level to interfere with the operator's movements as he loads a work piece or changes the cutter?

FEED

- Is the automatic feed mechanically positive and consistently precise?

To check your answers to these pertinent questions, call your Red Ring representative and suggest he bring along Bulletins AP 57-11 and S-57-2—All in the interest of ECONOMY.

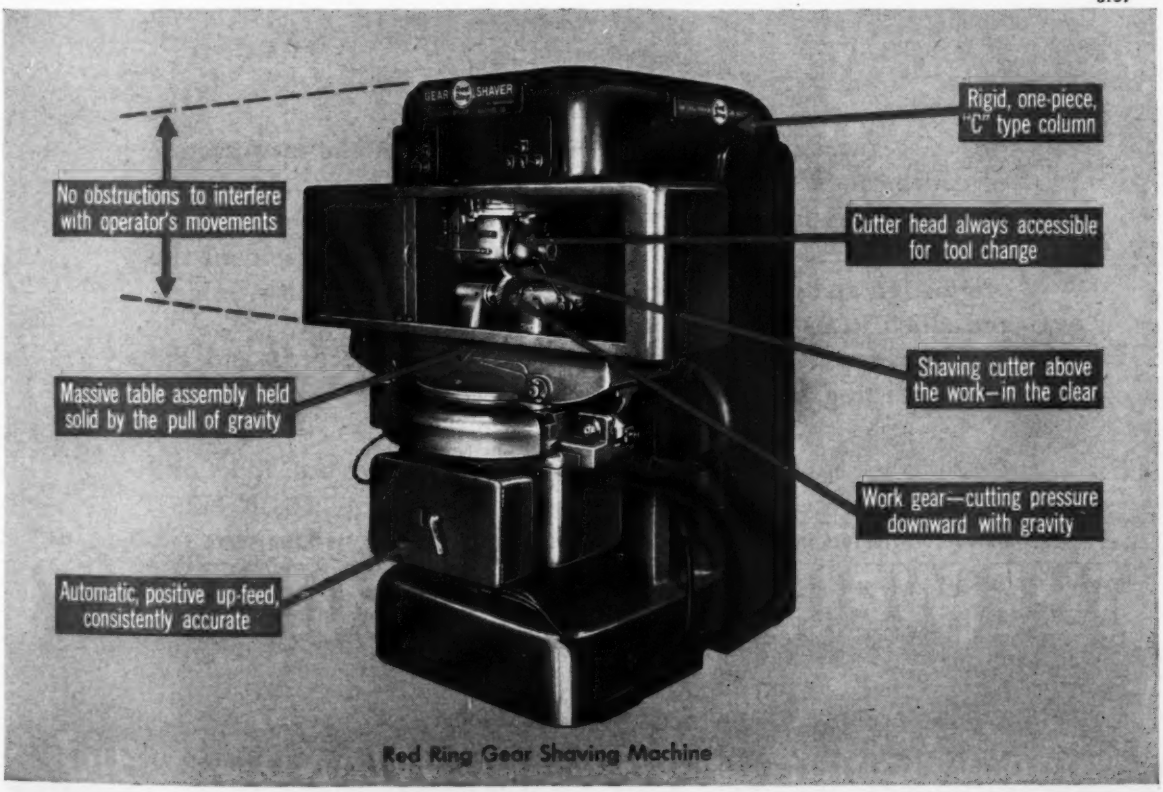


NATIONAL BROACH & MACHINE CO.

5600 ST. JEAN • DETROIT 13, MICHIGAN

WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

B159

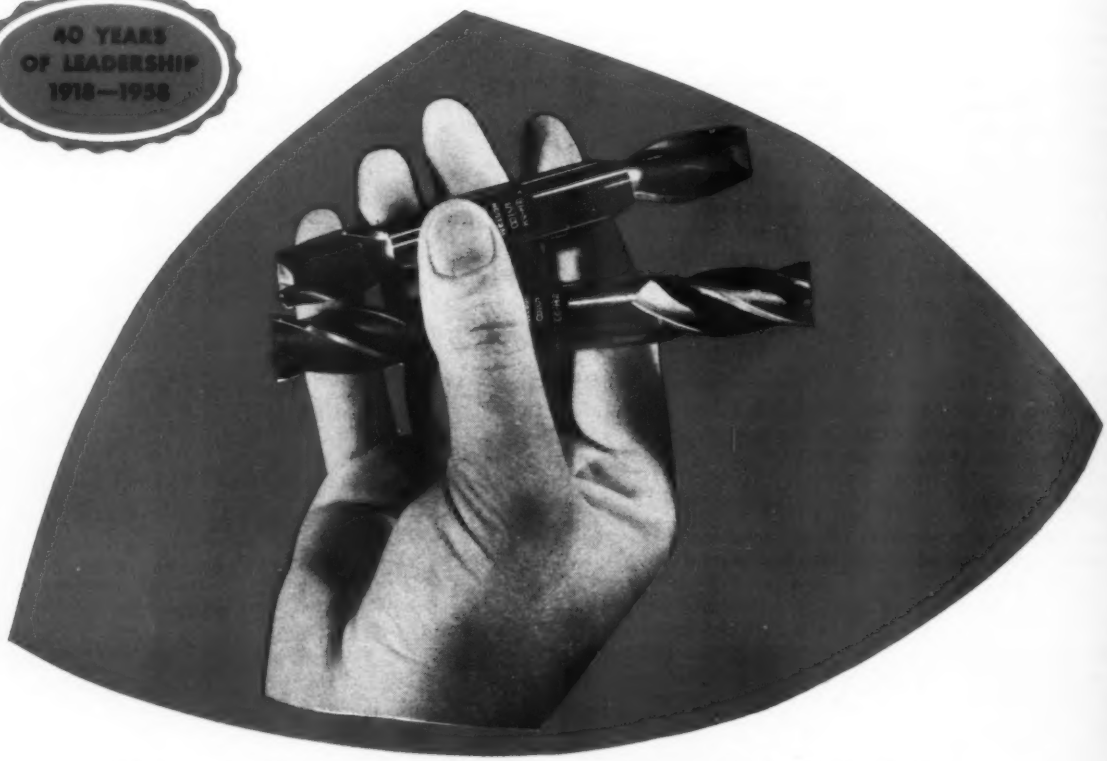

Rigid, one-piece, "C" type column
No obstructions to interfere with operator's movements
Cutter head always accessible for tool change
Shaving cutter above the work—in the clear
Massive table assembly held solid by the pull of gravity
Work gear—cutting pressure downward with gravity
Automatic, positive up-feed, consistently accurate
Red Ring Gear Shaving Machine

CIRCLE INFORM-A-GRAM KEY NO. 5

YESTERDAY'S PIONEER . . . TODAY'S LEADER

EXPERIENCE / THERE IS NO SUBSTITUTE!

40 YEARS OF LEADERSHIP 1918—1958



40 years' successful experience as a company in the manufacture of cutting tools means that when you buy Weldon tools you are assured of the finest.

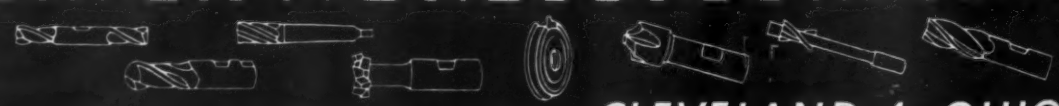
For all of these years we have consistently led the field in the origination and production of the highest quality end mills, holders and allied items.

Specialization for 40 years—that is the Weldon record—and the best of cutting tools is the result.

Catalog list numbers are now marked on all Weldon tools and holders as an aid when reordering . . . another WELDON FIRST.

Weldon distributors throughout U. S. A. and Canada carry complete stocks to serve you. EX2

THE WELDON TOOL COMPANY



3000 WOODHILL ROAD . . . CLEVELAND 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 6

V-R Multiple tooling cuts at BOTH 450 and 113 s. f. p. m.

How V-R Carbide and TANTUNG® cast alloy gang up to solve cutting problems

PROBLEM: How to bore 2" I.D. at 113 SFPM while turning 8" O.D. at 450 SFPM.

SOLUTION: A V-R toolholder and throw away insert will perform perfectly on the 450 SFPM O.D. but the 113 SFPM boring speed demands the cutting qualities of V-R TANTUNG cast alloy. TANTUNG is especially engineered for speeds between carbide and High Speed Steel.

V-R Carbide and TANTUNG make a perfect tooling team to solve this and many other cutting problems. Ask your V-R Representative or write for complete information. V-R Engineers will be glad to work with you on all of your cutting problems.

25 YEAR

V-R® **Vascoloy-Ramet corporation**

PRIME MANUFACTURERS OF REFRACTORY METALS ENGINEERED FOR THE JOB

CT-702

824 Market Street • Waukegan, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 7

You can CUT YOUR COSTS with these new and improved CLEVELAND TOOLS

The Cleveland Twist Drill Co., with its more than 8[illegible] years of experience and "know how", is constantly work[illegible] ing on new developments and improvements to kee[illegible] pace with modern metalworking techniques. Every too[illegible] designed and manufactured to the same high standard[illegible] which have made the familiar ◈ trademark famous, will give you *more production per dollar.* For complete information, contact our nearest Stockroom or . . .

TELEPHONE YOUR INDUSTRIAL SUPPLY DISTRIBUTOR

MO-MAX T-Shaped Ground Cut-off Blades

These improved blades are available in MO-MAX or MO-MAX COBALT High Speed Steels, heat treated to produce *more cuts per grind.* Head and body are ground to close tolerances, resulting in accurate uniformity and reduced set-up time.

Split Sleeves for Straight Shank Drills

The hole in these high quality sleeves is concentric with the body, assuring less run-out at the drill point, longer tool life and better holes. Used with tanged straight shank drills, you get *more flute length at lower cost.*

MO-MAX Hardened and Ground Drill Blanks

New Drill Blanks—hardened all over, and ground without back taper. Wire gauge, letter and fraction sizes, No. 80 to ½ inch, singly or in sets. Useful for making punches, tool bits, countersinks, boring tools, burring tools, etc.

Carbide Die Drills for Hard Steel

For drilling hardened steel in the range of 48 to 65 Rockwell C. Holes may be drilled without annealing or appreciably changing the structure of the material. Can be used with or without coolant.

END MILLS

Two Flute Extra Long Ball-nose

They have the extra length for milling fillets and pockets which cannot ordinarily be reached by the conventional length end mills. With these center cutting end mills, the initial hole may be "drilled".

Hy-Spiral Two Flute Double-end

Proper rake angles and cutting edge relief assure efficient milling in non-ferrous materials and in the harder alloys. Positive chip ejection . . . no build-up on the cutting face. Especially economical on long runs.

Two Flute Double-end Ball-nose

Machine-ground notch and ball end assure the easy removal of chips in deep slotting and pocketing operations, with the resultant savings realized in more material milled per grind. Economical on production runs.

Heavy Duty with Duo-Drive Shanks

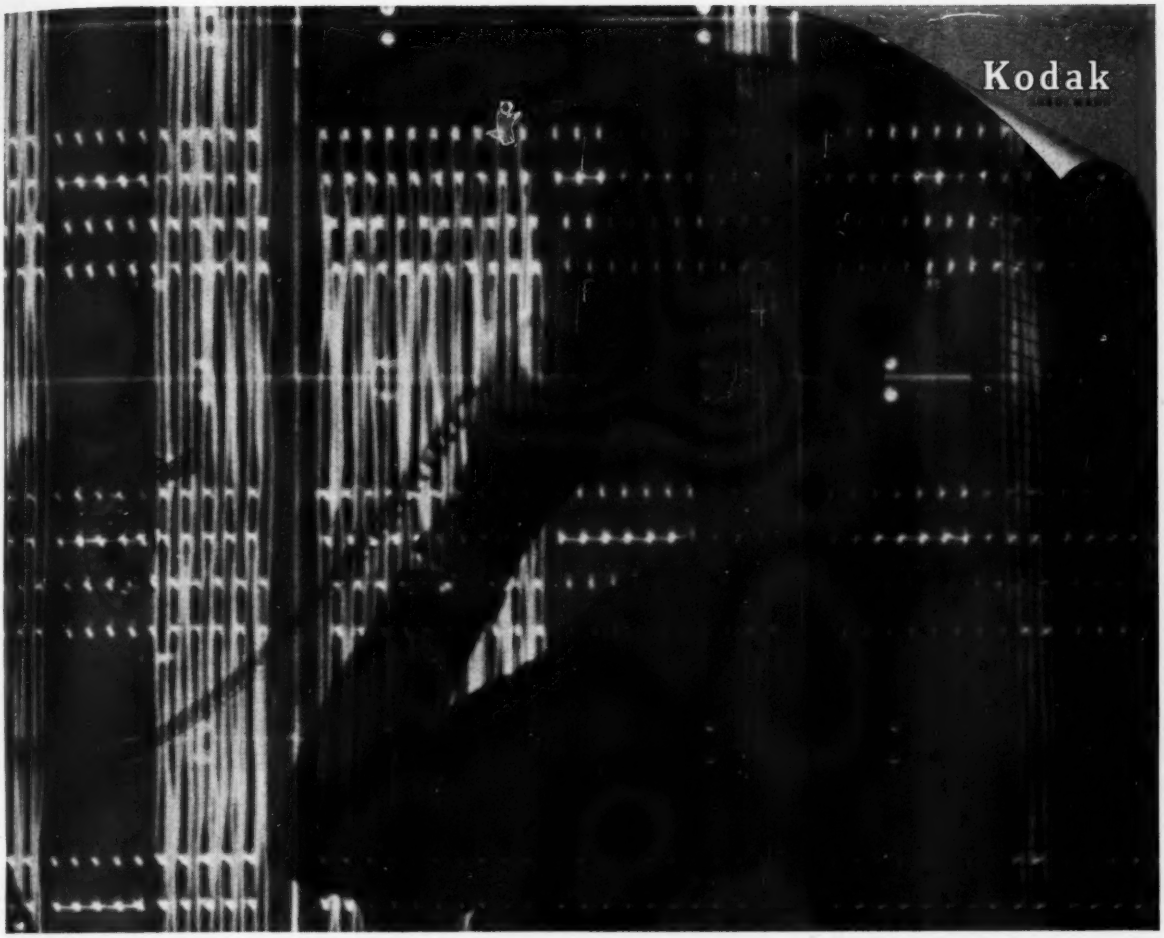
The 2 inch DUO-DRIVE shank fits the conventional two-set-screw-drive holder as well as the bayonet-lock type of holder. Heavy web construction, accurate machine-ground end-tooth notching and special surface treatment.

500 SERIES Four Flute Center-cutting

Now you can get the plunge cutting ability of a two or three flute end mill with the finer finishes and better size control that are possible with a four flute end mill. Made with square nose or ball nose.

THE CLEVELAND TWIST DRILL CO.

1242 East 49th Street • Cleveland 14, Ohio



Here's a case where optical gaging is the only practical answer

The heart of the central dial switching system made by Stromberg-Carlson, Division of General Dynamics Corporation, is the XY* Universal Switch.

A key "muscle" in this heart is a small wiper spring, whose 24 exact dimensions resisted measurement by mechanical means. Yet any flaw in this critical component could seriously impair telephone service.

With the Kodak Contour Projector all 24 dimensions of this wiper spring are optically gaged to tolerances of ±.0005"—and the job takes just *three minutes.*

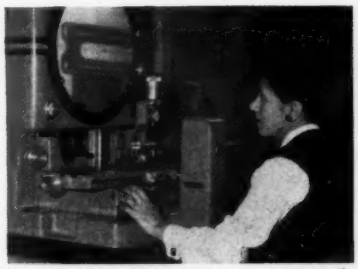
In this case Stromberg-Carlson found that optical gaging was the *only* practical inspection method. Special mechanical gages could have been devised, but then inspection would have taken—not three minutes—but as much as an hour per part.

Because Stromberg-Carlson makes and uses a wide variety of complex, hard-to-inspect products, the company uses 9 Kodak Contour Projectors in its Telecommunication Division, alone. They solve problems in receiving, production, and tool inspection as well as in final inspection.

If you have a gaging problem that involves close-tolerance measurement of precision parts with many dimensions, you can probably solve it best with a Kodak Contour Projector. To find out how optical gaging can help you, send for the booklet "Kodak Contour Projectors."

*XY is a registered trademark of Stromberg-Carlson

Final inspection of a 24-dimensioned wiper spring, a vital part of Stromberg-Carlson's dial switching mechanism, is practical only with optical gaging.



In another inspection area, an operator easily measures the critical dimensions of a relay lever arm with a Kodak Contour Projector to assure exact tolerances.

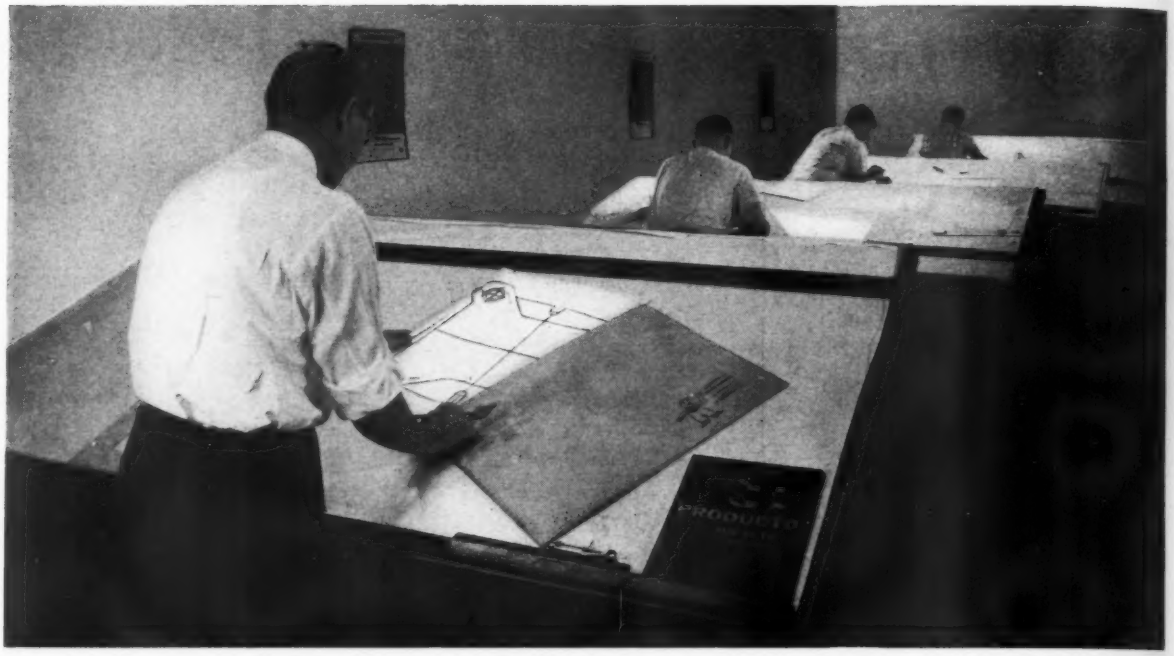
Apparatus and Optical Division

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

the KODAK CONTOUR PROJECTOR

CIRCLE INFORM-A-GRAM KEY NO. 9

Why the Die Designer Prefers PRODUCTO Die Sets



He can specify Producto with complete confidence

The die designer likes to specify Producto die sets on his blueprints because they are a nationally-accepted "brand." They're easy to get anywhere... and delivery is prompt.

He favors Producto because he knows he never has to compromise his die design. Even if the die layout is a little unusual, he will be able to select a die set to accommodate it from Producto's wide range of thicknesses and styles.

He also knows Producto has the equipment that can cut his tooling costs by letting him adapt his sets to a more economical *basic* design. Only Producto offers him complete foundry, pattern-making, welding and machining services for his special requirements.

The die designer recognizes Producto's Qwik-Fit Guide Pins as an important new feature that die makers want. He specifies them because they save up to 75% of the time normally required for die set assembly and disassembly.

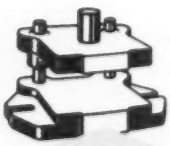
The die designer likes to use Producto's new catalog, the industry's most practical tool. His die layout is simplified when he uses Producto die set templates. And Producto provides him with cost-saving ideas in the DIE SET DIGEST.

Most important, he can depend on *consistent* Producto die set accuracy to transfer from the drawing board to the press the precision and ingenuity of his die design.

Yes, the designer has found that Producto die sets justify his confidence in specifying Producto. You will, too.

TWO FREE AIDS to more economical, efficient use of die sets are available from Producto. All-new CATALOG NO. 11 makes ordering and selection job easy. DIE SET DIGEST gives valuable tips for designers, builders and users of dies. Write for them today.

THE PRODUCTO MACHINE COMPANY
970 Housatonic Ave., Bridgeport 1, Connecticut



Wherever die sets are used

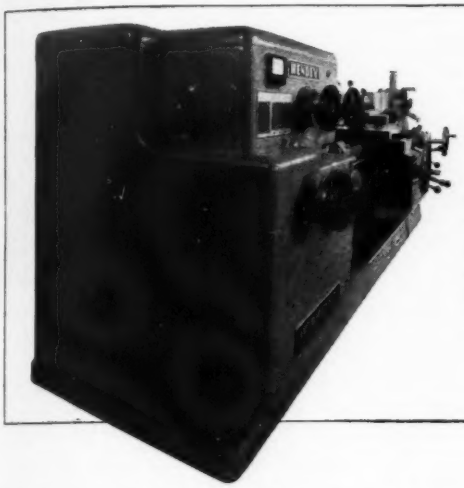
PRODUCTO

PRODUCE MORE WITH PRODUCTO PRECISION DIE SETS

CIRCLE INFORM-A-GRAM KEY NO. 10

Barber-Colman's new 36-speed lathe

gives you the three things you need to profit from throwaway tooling!



Throwaway tooling suddenly makes modern lathes a financially attractive investment. High spindle speeds are important, but so are rigidity, ease of operation, and precision. With expendable cutting tools and the right machine, higher speeds can add new dollars to today's low profits.

The biggest victory for carbides in 20 years is throwaway insert tooling!

And now is the time to invest in a new Barber-Colman 36-speed lathe . . . which combines precision, high speed, and ease of operation . . . to take advantage of the new savings made possible by these *expendable* cutting tools.

Speeds up to 2000 rpm are available for faster cutting — not at yesterday's rates calculated to prolong tool life — but at today's and tomorrow's rates designed to give economical tool life. You might spend more for carbide, but other savings make a big difference in the value added to the piecepart.

Rigidity where you need it

Negative-rake throwaways require power and rigidity. And here's where many old machines fail. Barber-Colman's carriage, cross slide, tailstock, and spindle are designed for heavy-duty, accurate work. Look at the depth of the apron which takes the thrust load from the tool. The carriage has a wide 30″ span over the ways and guides on the front V-way right under the compound. The tailstock weighs over 400 lb, and two heavy clamps hold it rigidly even when cutting workpieces of maximum size.

Controls for busy operators

But, why use indexable, quick-change tools on lathes which waste hours per day because they're difficult to set up and operate? All controls on the "Barber-Colman" are human engineered to save time on high-production or short-run jobs. Only two dial-type, quick-reset handwheels mechanically actuate all 36 speed changes. The drive clutch can be operated from the apron *or* headstock. Engagement and direction of longitudinal-feed and cross-feed actuation are controlled from the apron, which also provides a thread-chasing dial and handle for engaging the half nuts.

No vibration from spindle

Speed, rigidity, and ease of operation are only part of what's needed for tomorrow's faster machining. Precision is a "must"— that's why Barber-Colman provides a *balanced,* accurately ground spindle supported at both ends and in the middle by *three sets* of precision tapered roller bearings. An automatic spindle bearing adapter gives a constant preload at all spindle speeds. You can do better work with precision inserts because there is no spindle vibration — use your lathe for both toolroom and production turning.

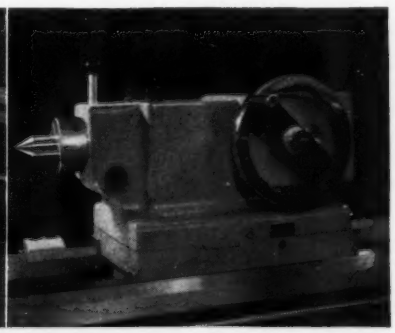
See a demonstration

Before you buy a new lathe, see this one operate! Your Barber-Colman representative or dealer can arrange a demonstration either in his showroom or in Rockford.

Write for more information

New 16-page catalog will show you how the new Barber-Colman 36-speed lathe can pay for itself quickly as a replacement for an old lathe. It describes and illustrates the full line of threading features you want for toolroom and shop work. Write for a copy today.

Heavy-duty apron provides maximum rigidity and ease of operation. Carriage rides on front V-way, front flat-way and rear flat-way.



Heavy-duty tailstock weighs over 400 lb, yet can be positioned quickly and easily with one hand due to special antifriction mounting.

Barber-Colman Company
117 Loomis Street, Rockford, Illinois

Don't expect a day's work for a day's pay on yesterday's machine tools

BARBER COLMAN ®

PRECISION LATHES

CIRCLE INFORM-A-GRAM KEY NO. 11

THE METALLURGY OF VANADIUM, by William Rostoker. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York 16, N. Y., 1958. 185 pages, $8.50.

Of interest to the metalworking industry is the current research on the potential usefulness of vanadium. Dr. Rostoker, of Armour Research Foundation, presents an up-to-date, comprehensive study of the metal and its alloys, drawing on all presently known information. This treatment of the extraction, properties, and processing of the metal does much to dispel the obscurity surrounding the element vanadium, and provides valuable reference material for seekers of new materials for special applications.

PROCEEDINGS OF THE 1957 NATIONAL ELECTRONICS CONFERENCE - Volume 13. Published by the National Electronics Conference, Inc., 84 E. Randolph St., Chicago 1, Ill., 1958. 1066 pages, $7.50.

The 94 technical papers included in this volume cover many fields of electronics. New techniques affecting the industry, engineering of electronic aids to the medical profession, radio astronomy, and instrumentation, are some of the categories included. The papers reflect many of the new developments in electronics and discuss ideas which will stimulate interest in related fields.

BASIC MOTION TIMESTUDY, by Gerald B. Bailey and Ralph Presgrave. Published by McGraw-Hill Book Co. Inc., 330 W. 42 St., New York 36, N. Y., 1958. 195 pages, $5.

Design engineers and estimators can predict the labor cost of new methods through use of a predetermined-time system. Units of motion, having definite starting and stopping points, are the basis of this system using predetermined motion times. This book, written for trained timestudy men, deals with the identification, isolation, and measurement of the basic motion units, showing how time data thus obtained is used to set standards of manual work.

MATHEMATICAL PROGRAMMING, by Nyles V. Reinfeld and William R. Vogel. Published by Prentice-Hall, Inc., Englewood Cliffs, N. J., 1958. 274 pages, $6.75.

Mathematical methods described in this book are used for analysis and solution of a variety of industrial problems, including production scheduling and machine work allocation. If data can be expressed quantitatively, taking into account the requirements and restrictions imposed, a "best-of-all-possible" solution is arrived at through use of simplified mathematical methods. The thorough discussion of methods and applications assumes a minimum mathematical background, and is intended to enable an industrial manager to utilize mathematical programming as an effective tool. Detailed case studies of actual industrial applications are included. The appendix contains a useful section on mathematical notation.

MODELMAKING FOR INDUSTRIAL DESIGN, by Ralph R. Knoblaugh. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y., 1958. 276 pages, $9.75.

Techniques of building models to aid the industrial designer are demonstrated in this how-to-do-it book. The step-by-step procedures outlined enable the designer to construct models which will express or test new design ideas. Working of plaster, plastics, wood, and metal with simple hand tools and small power tools is thoroughly explained. Layout, assembly, and paint finishing are fully treated and methods are clearly demonstrated with illustrations.

CONVEYOR TERMS AND DEFINITIONS. Published by Conveyor Equipment Manufacturers Association, One Thomas Circle, Washington 5, D. C., 1958. 95 pages, paperbound, $2.

Modern industry has come to depend on the continuous, mechanized handling of materials by conveyors; they provide the integrated flow and precise timing necessary for efficient large scale manufacturing processes. This listing and explanation of terms used in connection with conveying equipment serves as a handy reference for those who are concerned with design, maintenance, and uses of conveyor systems. The ASME Safety Code dealing with conveyors and related equipment is included in the book.

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Bulletin 37-A: "Proof That Meehanite Bridges The Gap Between Cast Iron and Steel"

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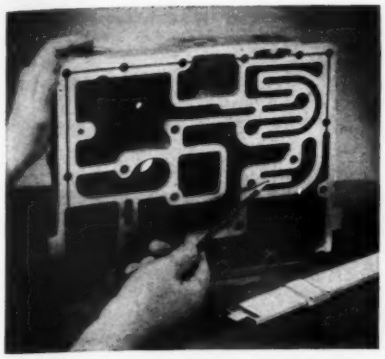
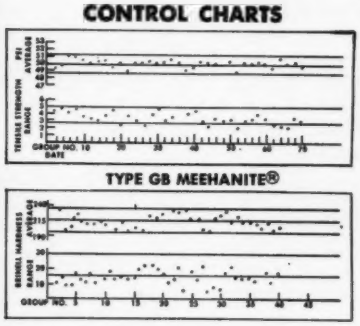
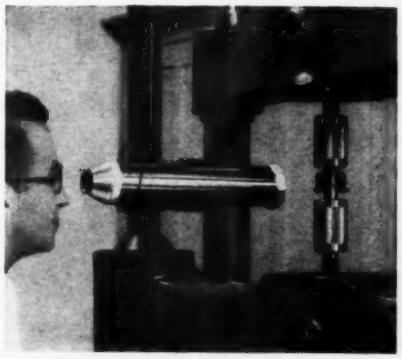
6 REASONS WHY DESIGN ENGINEERS SPECIFY MEEHANITE CASTINGS







1. CASTING SOUNDNESS

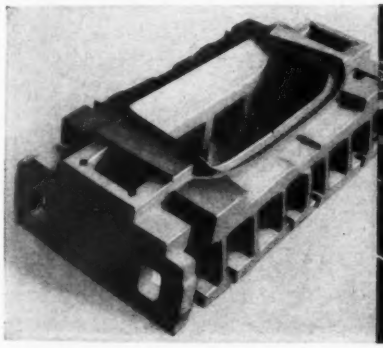
Of all casting properties this is the most important and is the BIG reason engineers specify Meehanite metal. They know from experience that Meehanite castings possess uniform strength and solidity through all sections, regardless of complexity of design or size. This assurance of casting soundness permits them to design with confidence.

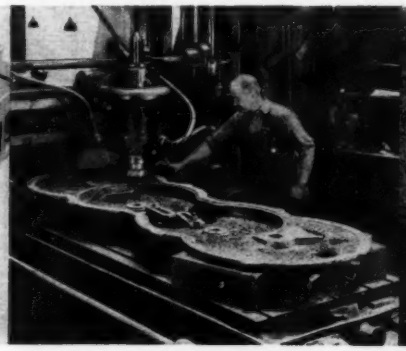
2. FOUNDRY CONTROL

The reliability of castings is measured not by the maximum tensile strength value a foundry can supply in a single casting, but by how consistent the strength values are maintained. Meehanite foundry technique assures delivery of castings that have uniform high strength properties from one to a thousand. This control is vital to the engineer.

3. ENGINEERING PROPERTIES

There are 26 types of Meehanite metal. Each has a distinctive combination of properties which include high elasticity, strength and toughness, excellent impact strength, good damping capacity and superior wear resistance. This makes it easy for the engineer to select the type best suited to his conditions of service.





4. DIMENSIONAL STABILITY

Meehanite metal has found wide favor with design engineers because it exhibits an unusually high degree of dimensional stability in the "as cast" and also in the hardened condition. The ability to cast to close tolerances provides engineers with greater freedom in design and contributes directly to reductions in weight and machining costs.

5. LOW MACHINING COSTS

Engineers striving to cut costs as well as metal, turn to Meehanite®. The uniform structure of Meehanite® permits high speeds and feeds to be used with safety. Freedom from white edges and hard spots increases tool life. Meehanite metal shows a higher strength to machinability ratio than steels or unalloyed irons of equal strength and takes a high polish.

6. OUTSTANDING PERFORMANCE

Meehanite metal is saving Industry thousands of dollars each year in reducing the final cost of the component and increasing service life. A typical example is illustrated. In this application Meehanite metal Tooth Caps for heavy-duty land clearing rakes provide long wear life without failure under severe impact conditions.

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Talk of the Month

THOUGHTS ON AUTOMATION'S IMPACT

by Chester S. Johns
Sales Manager
BUHR MACHINE TOOL COMPANY
Ann Arbor, Michigan

IT IS GOING TO BE QUITE A TRICK to cover this evening a subject that has been in the making for 25 years, but in the short time we have, perhaps it will be possible to clarify some of the very basic ideas concerning the relationship of automation to our economy.

Before we proceed too far, it will probably be a good idea to make sure that we understand clearly the definition of the two words that form the key to the whole discussion. Those words are "automation" and "economy."

I doubt that there are many who will question my statement when I say that the present day popular definition of automation is a far cry from the meaning of the word when it was first coined ten years ago. One need only to read the daily newspapers to see the use of the word in a way that those of us in the automotive industry might question. An example of this is a recent article which appeared in the *Wall Street Journal*, explaining that automation had come to the curbs of New York: Seemingly, a new disposal system which allowed a pedestrian to drop his cigarette in an ash tray and have it conveyed automatically to the gutter had been interpreted as being automation.

With this broad concept of the word being used, I feel that it is important that we try to analyze the different principles of automation and how they affect the economy. Perhaps the best way to do this is to cite some examples which are relatively new:

- In a California assembly plant, body transfer through trim-line is under one operator at master control console.
- A Texas steel company automatically converts discarded automobiles into high-grade material free from impurities and nonferrous adulterants.
- At a California aircraft company, an electronic computer is probing all phases of human behavior—heart disease, nerve and brain cells.
- A leading steel corporation has a communications center that processes 10,000 orders per day, three service centers that employ a metallurgist, sales-order expert, and mill-schedule specialist, each.
- A New York clothing warehouse five stories high, can receive and ship 150,000 units a day.
- A Chicago mail-order house prints and mails more than 40-million catalogs a year.
- A large American clock maker has a packaging system that prepares

Adapted from Mr. Johns' recent address before the Michigan District of the National Screw Machine Products Association.

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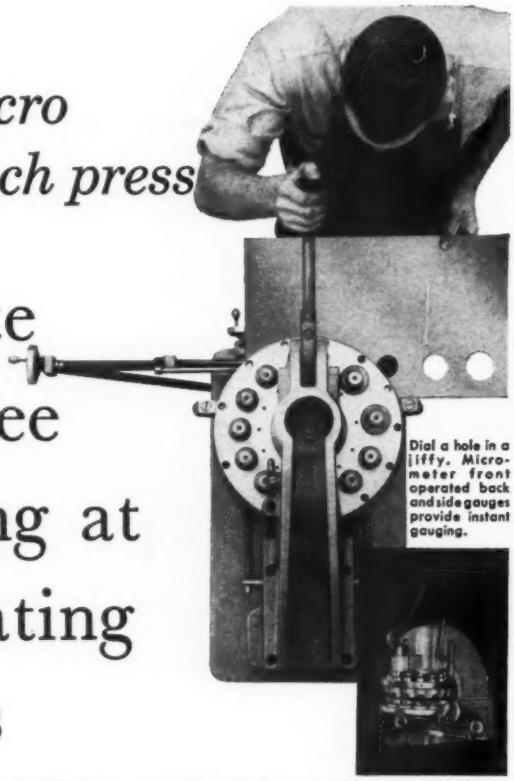

Dial a hole in a jiffy. Micrometer front operated back and side gauges provide instant gauging.

The new Di-Acro 4 Ton Turret Punch Press provides rapid, close tolerance punching of round, square, oval and rectangular holes from 1/16" to 2".

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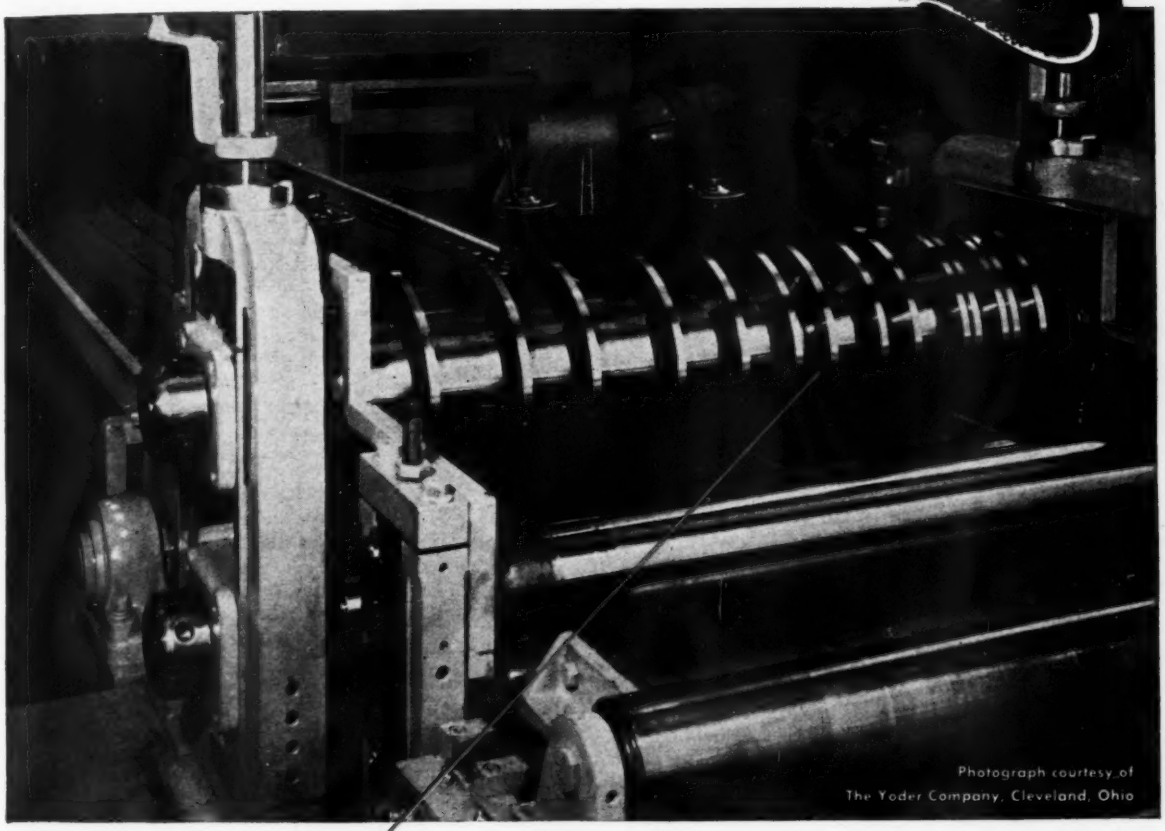

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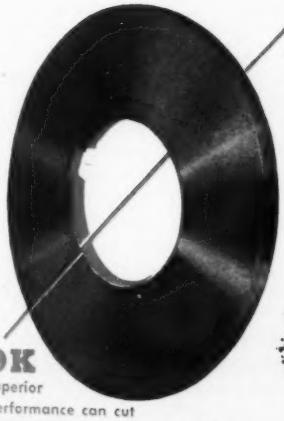

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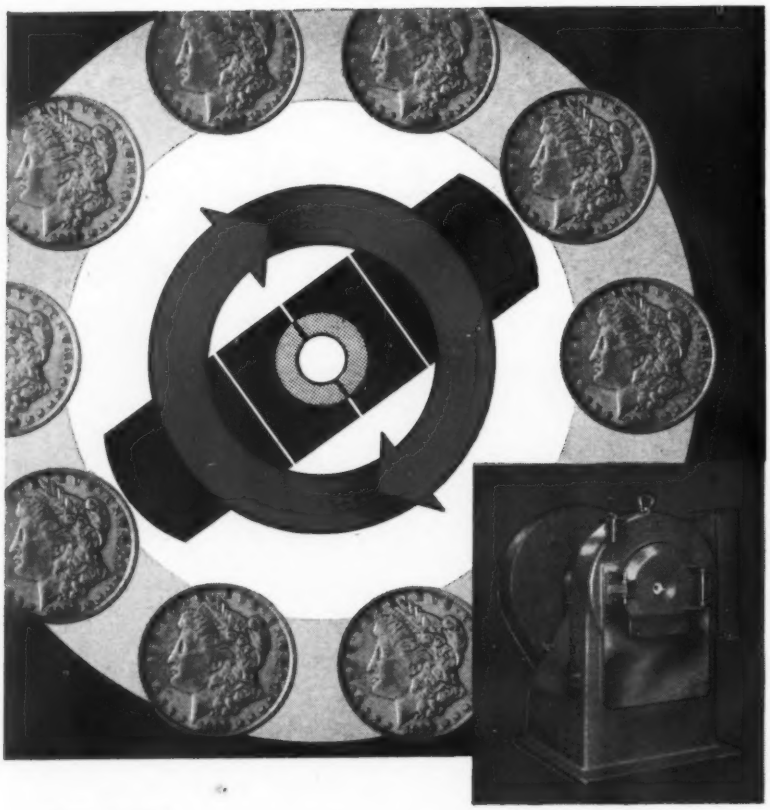

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- material savings
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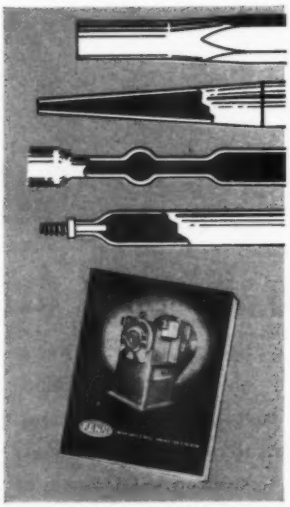
Fenn Swaging Machines offer many advantages in both design and construction. They perform an almost limitless variety of pointing, tapering, reducing, sizing, and assembly operations. Capacities range on solid bar stock from 5/32" to 3 3/8", and tubing to 6". To be sure that you are not machining when you should be swaging, write for Fenn swaging catalog.



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516 clocks for shipment every 12 min.

Automation has come to mean the combining of repetitive consecutive actions formerly performed physically or mentally by human beings. This means not only the physical processing of material goods but, I believe, also the coordination of repetitive actions normally taken by the human mind.

The second word which needs clarification is the word "economy." Webster defines economy as the management or science of management of the resources of a community or nation, with a view to productiveness and avoidance of waste. A second Webster definition indicates that economy means the disposition or regulation of the parts or functions of any organic whole; an organized system or method.

Proponents of mathematical interpretations try to explain our economy in terms of gross national product, productivity indexes, government spending curves, and the like. These technical interpretations are difficult for the layman to understand. For that reason, it would be well for us to speak a language that we all know.

People Are Most Important

A close look at the technical definitions reveals that the U. S. Economy falls under the control of one main factor—people. People defined as the consumer, people defined as labor, and people defined as management.

If we wish, therefore, to know what impact automation has on our economy, it is reasonable to assume that the extent that automation affects these three classifications of people will give us a pretty good picture of what we are seeking.

Let's look at the first classification — the consumer. The consumer controls one-half of the twin economy-factors known as supply and demand. With full control over demand, the consumer — whether he knows it or not — plays a large part in determining the total volume of our gross national product.

Most of us are not interested in the factors that go to make up the cost of what we pay. We are interested only in what the cost is. But I believe that if you remember the examples of automation given at the beginning of this talk, it will be pretty clear to all of us that automation touches every American, whether he or she knows it or not.

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with the ability to buy goods and services unavailable to other nations. In this respect, although automation does not interest us as it probably should, we would all surely feel the effects of its loss.

The second classification of people affected by automation is labor. Let us look at the results of automation that involve changes in the characteristics of our labor force. Obvious to most of us is the decreasing proportion of direct labor and the increasing number of indirect workers required by mechanized production. This very simple change has started a national trend towards rapidly increasing the number of service personnel needed to support productive workers.

Skills needed by the future labor force—both production and service personnel—are not only difficult to anticipate but doubly difficult to develop. In the past 10 years, worker skills have changed dramatically. Who can guess what will be required 10 years from now? Electronic system maintenance will undoubtedly continue to increase in importance but new skills will be required.

Industry has never found a way to pay trainees enough to make the time involved in learning new skills attractive. This is only natural because learning time is usually nonproductive time. Since new skills will be required, it becomes necessary to develop them outside of industry. Automation will thus have a pronounced effect on various schools—secondary public and trade—whose students will be going into the labor force.

New Breed Of Managers Needed

The impact of automation on management is perhaps the most profound and involves the greatest challenge of all. For management men must not only use it for the greatest possible good, but they must also realize the changes that it makes on their organization. Automation has done a great deal to increase the thought processes necessary in conducting a business. Things move faster and in larger quantities.

There is no less change taking place in managerial ability than there is in the skills of productive workers. Managers are faced with the problem of creating new areas of activity and new positions that will facilitate and correlate those actions necessary to an efficient operation. A good example of the new management concept can be found in the teams of engineers, production personnel, and sales staff.

Many companies realize that common goals must be understood by these three so ideas may flow freely from original concept to the consumer's hands. As a consequence, a new breed of managers is evolving. Engineers who previously concentrated on designs only must be able to grasp the problems of production, cost, and consumer demand. Salesmen must also know why deviations must be made between the original requirements of the consumer and the end product.

This trend toward a broader knowledge of business in one respect reverses the trend that has been toward specialization. This does not mean, however, that the trend toward specialization has been completely reversed. There are still many new jobs that are being created because of automation. Most of them are in the service phase of a business.

No doubt most of us, or perhaps all of us, have become aware of the need for more skills in analyzing facts. It is this preparation of data needed to run a business that is creating the need for new people. Not that we need more facts; we all seem to be buried by them now. We do need a clearer presentation of the facts so basic to our operations. This involves sorting out and eliminating a great deal of information that might be repetitive or unnecessary.

. . . continued on page 22

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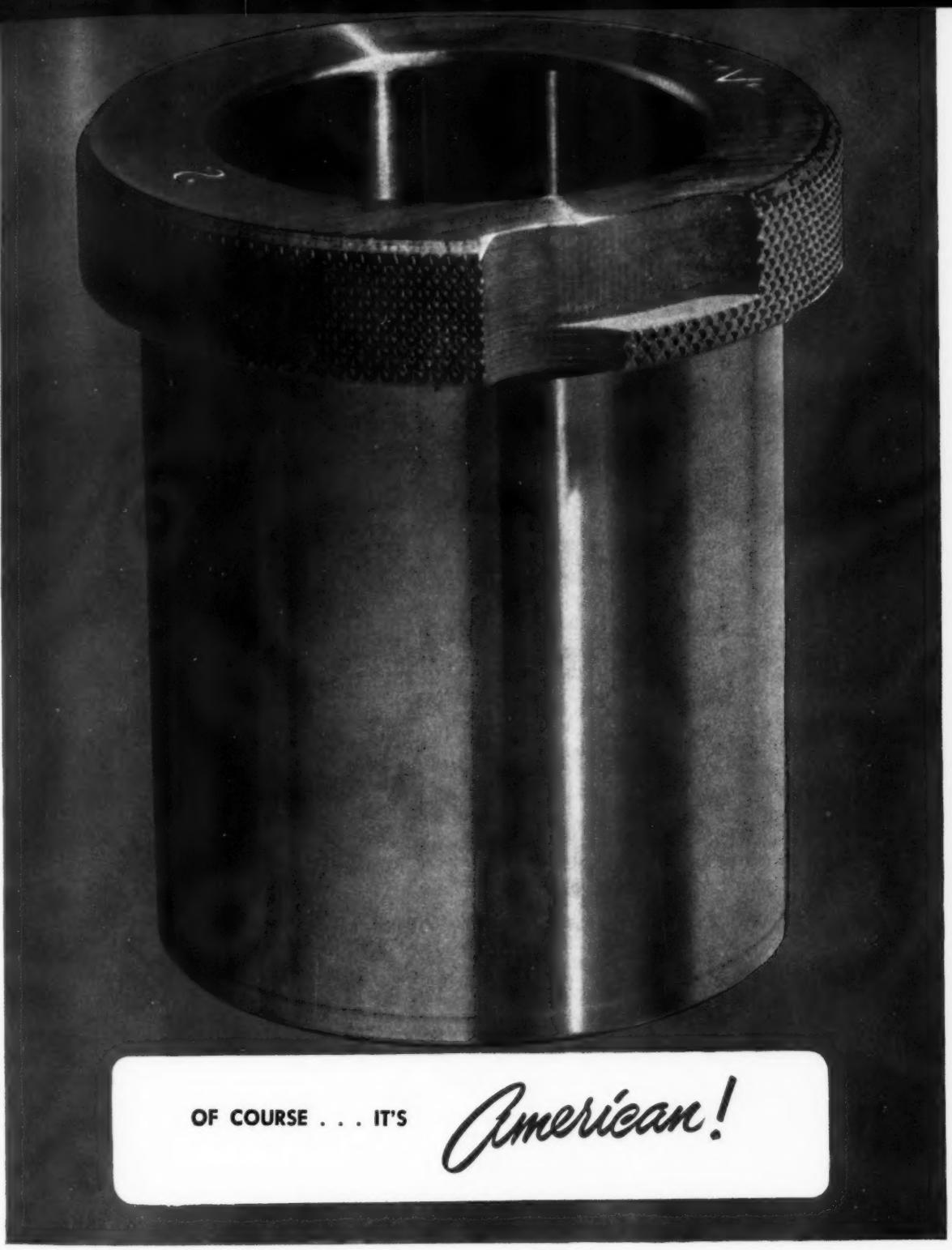

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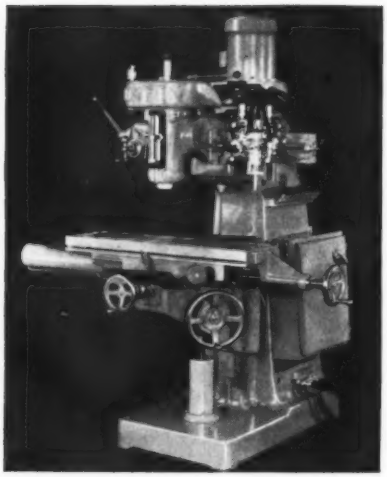


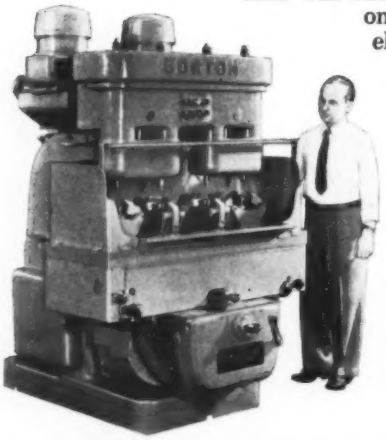
from 8 Hours per piece to 5 Minutes per piece

This standard Gorton Trace-Master Hydraulic Duplicator was purchased to profile a complex part from a simple master. Previous cost of this operation was $102.40. Present cost with this Gorton machine is $1.07. Saving per piece is $101.33.

*Cost figures were arrived at by using $2.80 per hour for operator's time and $10.00 per hour, Machine rate.

cost saving per piece . . . $1,139.20

This Gorton Horizontal Mill with special holding fixture, tooling, hydraulics, etc., was purchased to machine thirty-five impeller blades from the solid, involving compound curvatures, thicknesses and depths. Former production time was one piece in 100 hours. Present time on this new machine is one piece in eleven hours. Machine was paid for after machining 22 pieces.



$50,000 machine pays for itself in 41 Weeks

This Gorton 4-spindle "Automatic Cycle" Duplicator was purchased to mill out recesses in a round steel part. Original production time on a manually operated single spindle duplicator was 60 pieces per hour. Present production on this new machine is 204 pieces per hour. Cost saving is 71%.

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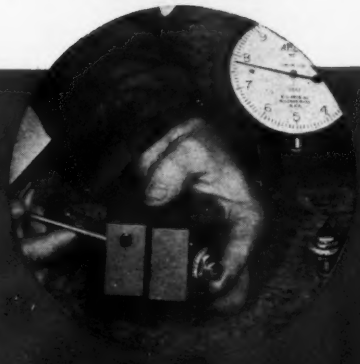
now, pre-set tools to accurate part dimensions outside the machine with this new Microbore® System

SIMPLE 4-STEP PROCEDURE

1. To set up pilot tool, insert Microbore "Pre-Set" unit in boring bar. Adjust to part dimension by trial cut and final setting using Micrometer Vernier adjustment.



2. Remove adjusted pilot unit from the boring bar and install in the standard Microbore setting gage.

3. Position indicator on the high point of pilot tool in setting block and adjust indicator to zero.

Eliminate trial cuts... change tools in seconds... simplify tool maintenance

Using a standard setting block and indicator, Microbore tools can now be pre-set to accurate part dimensions outside the machine and quickly locked in the boring bar or tool holder without further adjustment.

"Pre-Set" eliminates scrap parts due to trial and error set-up and greatly reduces down time for worn tool point adjustment. "Pre-Set" encourages the operator to keep sharp tools in the machine assuring greater accuracies and produces the maximum number of pieces per tool grind by minimizing breakage due to dull tools.

"Pre-Set" also makes it possible to replace worn tools without changing the entire boring bar or tool holder—eliminates the need for stand-by bars —simplifies tool grinding and maintenance.

Microbore System of "Pre-Set" tooling may be applied to boring, turning, facing and chamfering operations and is especially suited to production and automated operations where machines must maintain peak production on long runs. Write for complete information.

4. Adjust gage pin to same zero setting. Any number of additional tools may now be pre-set and interchanged with pilot for precision boring the same diameter.

If necessary to pre-set for depth of bore, tumble block to adjacent side and repeat procedure.

The DeVlieg Microbore System of Adjustable Precision Tooling includes Standard Microbore Boring Bars and Boring Bar Sets, Special Cluster Tooling, Flash-Change Tooling and Tool Holders, Flash-Change Replacement Bridgeport Spindles, Turret Lathe Turning Heads and Adjustable Boring Heads.

DeVlieg® Microbore® System

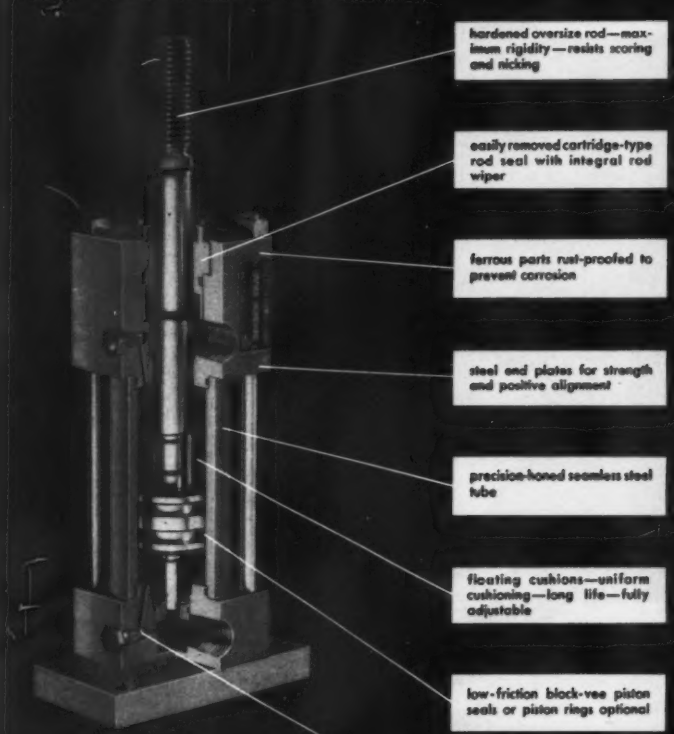
DE VLIEG MICROBORE • DIVISION OF DE VLIEG MACHINE COMPANY

Fair Street, Royal Oak, Michigan

CIRCLE INFORM-A-GRAM KEY NO. 21

for performance...
dependability...
economy... specify SP

HEAVY DUTY AIR and HYDRAULIC CYLINDERS


hardened oversize rod—maximum rigidity—resists scoring and nicking
easily removed cartridge-type rod seal with integral rod wiper
ferrous parts rust-proofed to prevent corrosion
steel end plates for strength and positive alignment
precision-honed seamless steel tube
floating cushions—uniform cushioning—long life—fully adjustable
low-friction block-vee piston seals or piston rings optional
springless ball checks for faster action

Rated 200 psi air or 1,000 psi hydraulic—interchangeable air or hydraulic without modification—built to JIC standards—specified by automotive manufacturers—conforms to Ford and Chrysler standards.

If your service requirements are severe . . . if you need uniform operation, long trouble-free life, minimum equipment downtime . . . you need S-P *heavy-duty* air and hydraulic cylinders!

Want more proof? A phone call will bring our representative on the run! Prompt deliveries, too. The S-P Manufacturing Corporation, 30201 Aurora Road, Solon, Ohio.

SP *for speed and performance*

Representatives in principal cities. Phone or write for Catalog No. 115.

Find us fast in the "Yellow Pages"

NON-ROTATING AIR AND HYDRAULIC CYLINDERS • ROTATING AIR AND HYDRAULIC CYLINDERS • POWER CHUCKS • COLLET AND DRILL PRESS CHUCKS • VALVES, ACCESSORIES

A BASSETT COMPANY • IN GREATER CLEVELAND • ESTABLISHED 1916

AA 7498

CIRCLE INFORM-A-GRAM KEY NO. 22

. . . Month's Talk from page 18

Delegate More Jobs

Top management in even some of the smaller organizations is faced with the prospect of even more and more delegation, because facts previously unavailable are now at their disposal. Analysis of the over-all operations requires a "divide and conquer" procedure. Each function of a business may be fully analyzed by a subordinate and the important factors presented to top management for over-all consideration. No manager, if he wants to be efficient, will be in a position to indulge in problems that are of a secondary nature. No manager will have the *time* to indulge in minor problems.

We have taken a very superficial look at the manner in which automation affects people and our economy. But from just the brief comments that have been made, it is obvious that this so-called science has, is, and will play a major factor in our economy.

In the past decade, automation has been used primarily to increase not only our productive capacity but the productivity of the individual worker. In many industries our present productive capacity exceeds the demand for the products. This is evident within the automotive industry, where an increase from approximately 5-million to 7-million cars in a year has been made in the last three years. You and I both know that 7-million cars are not sold each year. It may be questioned as to why the surplus production capacity has occurred. Practically every industry in this country has been preparing for a population increase that is in the not too distant future. They did not want to wait until the population got here. They wanted to be ready.

Assuming then that our production capacity is what we need, what can we expect from automation in the future? It is my belief that new advances will be made in the use of materials, in the improvement of product quality, and in the creation of new consumer goods. I believe that management will analyze these possibilities much more closely when they consider automation for the future.

From the purely basic relationship of automation to people, I do not think that in our lifetime we will see a completely efficient relationship occur. Technological advancements are moving much more rapidly than human change. For that reason, we can look forward to a very frustrating future.

MICROMETER THIMBLE is graduated to .0001" and provides dimensions between 1" steps on measuring bar. Measuring bar can be adjusted to enable the user to take readings up or down relative to a center line or other reference line on the work.

accurate to .00005" throughout the 18" range

That's right! Just 10 seconds to set this NEW 18" PLA-CHEK GAGE . . . and you are ready to start your inspections. In hundreds of installations on innumerable jobs PLA-CHEK GAGES are daily proving their time-saving and money-saving advantages. Extremely easy to operate—no auxiliary gage blocks are necessary—this PLA-CHEK 18" model guarantees accuracy to fifty millionths through its entire range. The measuring bar is made of deep-frozen, strain-free alloy steel. Because it is of one-piece construction the steps cannot change or separate with age. Since it is not necessary to touch the measuring bar, body heat does not affect it. Return the coupon or write TODAY for literature and complete details.

Cadillac PLA-CHEK GAGES are available in a complete range of sizes: 6", 12", 18", 24", 36", and 48" models. Precision-made risers, increasing the range of each model, are also available.

Cadillac
GAGE COMPANY
P. O. BOX 3806 • DETROIT 5, MICHIGAN

CADILLAC GAGE COMPANY
P. O. BOX 3806, DETROIT 5, MICHIGAN
Without obligation please rush complete information on the Cadillac PLA-CHEK Gage line to:

Name_____

Company_____

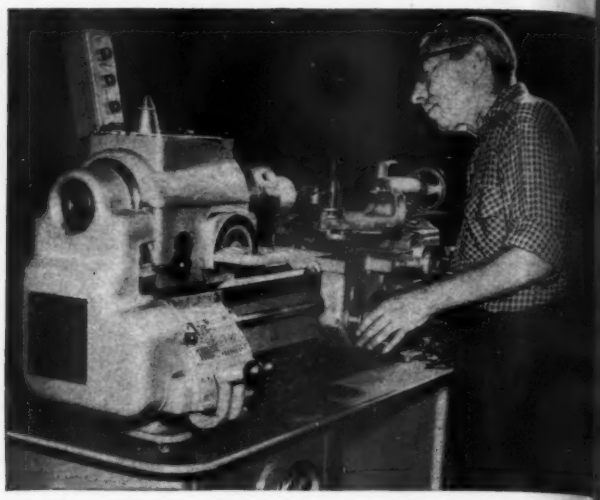
Address_____

City_____ Zone____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 23

DELTA INDUSTRIAL

DELTA 20" DRILL PRESSES are built to give you machine tool production capacity with power tool flexibility. Massive construction and rugged power make the Delta 20" a heavy-duty tool. Available with hand or power feed, choice of No. 2 or No. 3 Morse taper spindle. 28 models include floor, bench, multiple spindle and overhead types. Production tables, heads and columns available as components.



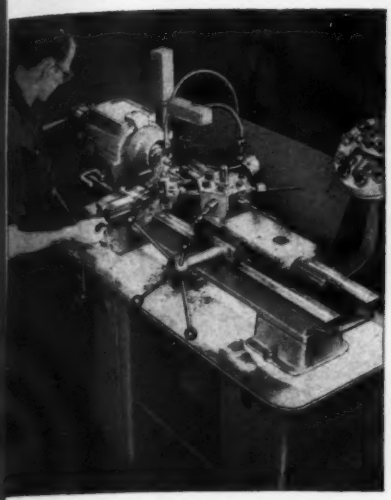
DELTA 11" METAL LATHES offer exclusive Delta Quality features such as massive head stock construction, perfected variable speed drive, unique 4-position drive selector and many more. Both 4 ft. and 5 ft. bed models available with flame hardened bed. And you get the double versatility of a ram-type turret lathe, when you add production accessories for precision multiple machining jobs.

A proved way to cut your costs

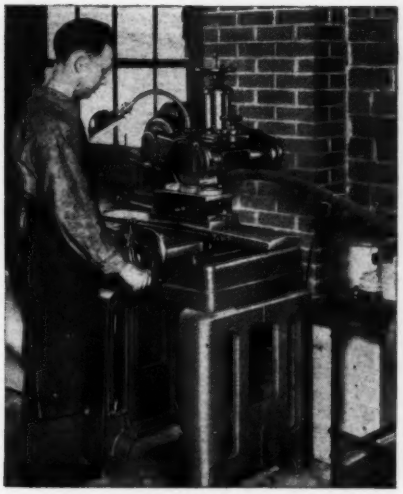
DELTA 17" DRILL PRESSES in over 70 models enable you to make your own single or multiple spindle set-up for drilling, counterboring, reaming and tapping jobs. Finest in their class, they are engineered for precision work and built for long life with low maintenance costs. Standard or power feed, high or slo speed and key chuck or tapered spindle available in floor, bench and multiple spindle models.

DELTA CUT-OFF MACHINES for fast, smooth, accurate cuts are speeding production and improving quality in tool rooms, maintenance departments and on production lines. Work head pivots for easy mitering. All belts, pulleys, cutting wheels or blades are fully enclosed for maximum safety. Whether you do wet abrasive or dry abrasive cutting, or cut non-ferrous metals or wood—you choose the model that's right for your job.

PRODUCTION TOOLING



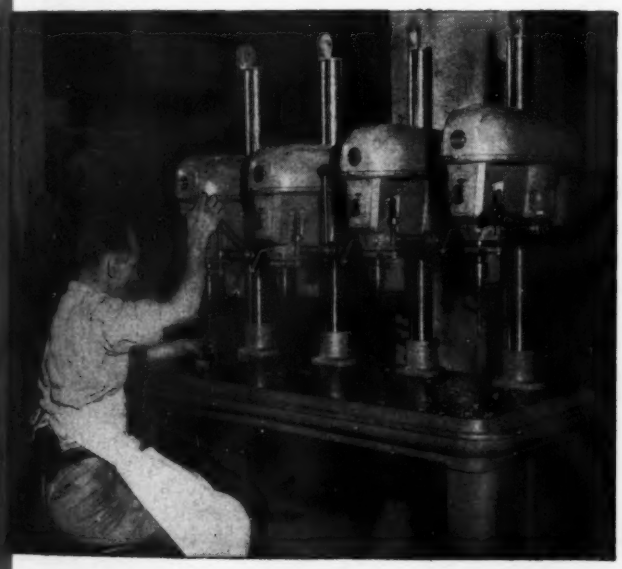
DELTA HAND SCREW MACHINES fill the production gap between standard engine lathes and expensive, automatic screw machines . . . and at lower cost than any comparable machine. Bed turret, double tool post cross slide and lever type collet closer are *standard equipment*. Delta Quality features throughout assure lasting precision on multiple machining jobs.



DELTA TOOLMAKER® GRINDERS perform three precision grinding operations—surface, chip breaker and tool and cutter grinding. And with Delta 6" tool grinders, 7" standard grinders and 2½" belt grinders you have a complete line of safe, accurate, low cost grinders for *every* shop need.

DELTA 14" BAND SAWS These versatile, low cost machines give you eight cutting speeds—ranging from 40 fpm for metal to 3000 fpm for wood—using a *standard* motor. They enable you to cut stainless steel, armor plate, high speed steel, cast iron, alloy steel and dozens of other materials including woods and plastics. Available with steel or cast iron stand.

on every metalworking job



DELTA 15" DRILL PRESSES offer such Delta exclusives as six spindle adapters, "universal" hand feed, counterbalanced belt guard . . . plus big, machine tool ruggedness and proven production dependability. Delta 14" utility and 14" Super-Hi Sensitive Drill Presses also available in many models.

See Delta Industrial Tools at your nearest Delta Dealer . . . he's listed under "TOOLS" in the Yellow Pages.

Thousands of metalworking plants across the country are cutting costs by using Delta Industrial Tools to supplement or replace expensive, special-purpose machines. Here's why: Delta tools are ruggedly built to withstand hard, continuous wear—they offer precision performance to meet the highest production standards—yet they cost less to buy, less to operate, and less to maintain. Completely portable, Delta tools can be moved in and out of production lines to relieve bottlenecks. And any plant can have inexpensive, automated operations through the combination of versatile, standard Delta components and automatic control devices.

Because Delta is the world's most *complete* line, you can choose the *right* tools for the biggest savings on *your* jobs.

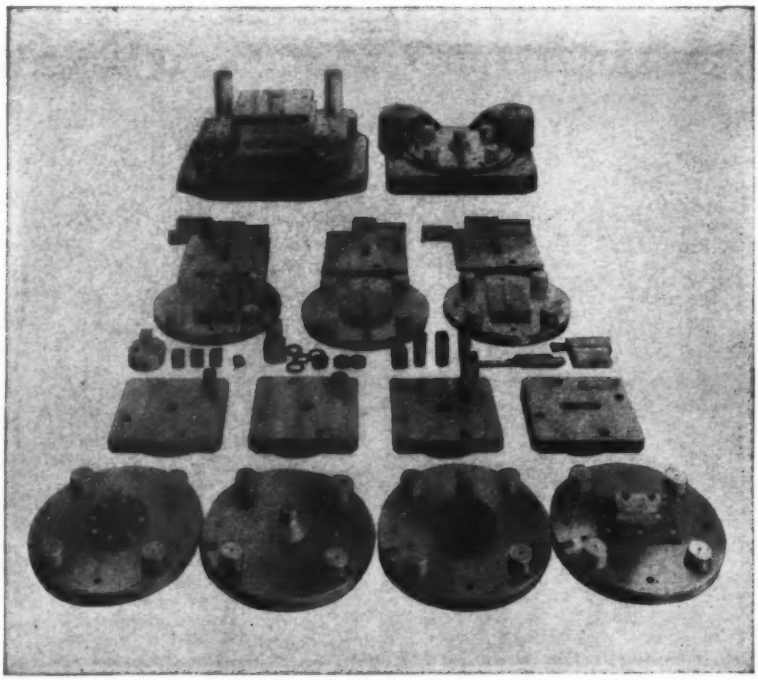
Get all the facts on how YOU can cut costs with Delta Industrial Production Tooling. Write for FREE Delta Industrial Catalog to: Rockwell Manufacturing Co., Delta Power Tool Div., 622L N. Lexington Ave., Pittsburg 8, Pa.

DELTA INDUSTRIAL TOOLS

another fine product by

ROCKWELL

CIRCLE INFORM-A-GRAM KEY NO. 25



ALL THIS **FROM ONE BASIC DIE**

One basic die with 8 different sets of cutting members was used to trim the 8 parts shown. Some are round, some are square, some are rectangular and the one in the die is irregular. Depths vary from ¼" to 3". **Only one basic die is used.**

A Brehm "Shimmy" Die with angular cams can be designed for almost anything you need trimmed — fountain pen ferrules, artillery cases, watch cases, burial vaults, automotive, kitchen, radio and television accessories and parts. *Send part prints for quotation on Brehm "Shimmy" and related dies, such as blank, form pierce.*

THE SHIMMY DIE — VULCAN TOOL COMPANY — REGISTERED U.S. PATENT OFF.

Brehm® trimming dies

ENGINEERING • PROCESSING • BUILDING • TOOLS
DIES • SPECIAL MACHINES • VULCANAIRE JIG
GRINDERS • MOTORIZED ROTARY TABLES • BREHM
"SHIMMY" AND RELATED DIES • AUTOMATION

VULCAN TOOL CO., YOUR TOOL ROOM IN DAYTON
BREHM DIE DIVISION • 731 LORAIN AVENUE • DAYTON 10, OHIO

VULCAN tools

CIRCLE INFORM-A-GRAM KEY NO. 26

MEN YOU SHOULD KNOW

Hoover Ball and Bearing Co. announces the following personnel changes: **William C. Lighthall,** vice president of Uniloy Inc., a wholly-owned subsidiary; **Robert C. Ressler,** general manager of the Ball and Bearing Division; **James C. Carman,** assistant general manager of Ball and Bearing Division; and **Carl Rhodes,** general manager of the Adrian Division.

Rudolph M. Maier has been appointed manager of product development for McKinney Mfg. Co.

Southworth Machine Co. announces that **Edward E. Kennie** is now coordinator of engineering and manufacturing for the company's Lift Table Division.

S. Eugene Bychinsky is the general manager of the newly formed Electrical Equipment Division of Chrysler Corp. **Fred E. Parker,** formerly manager of the Indianapolis plant, has been named executive assistant to the general manager of the division.

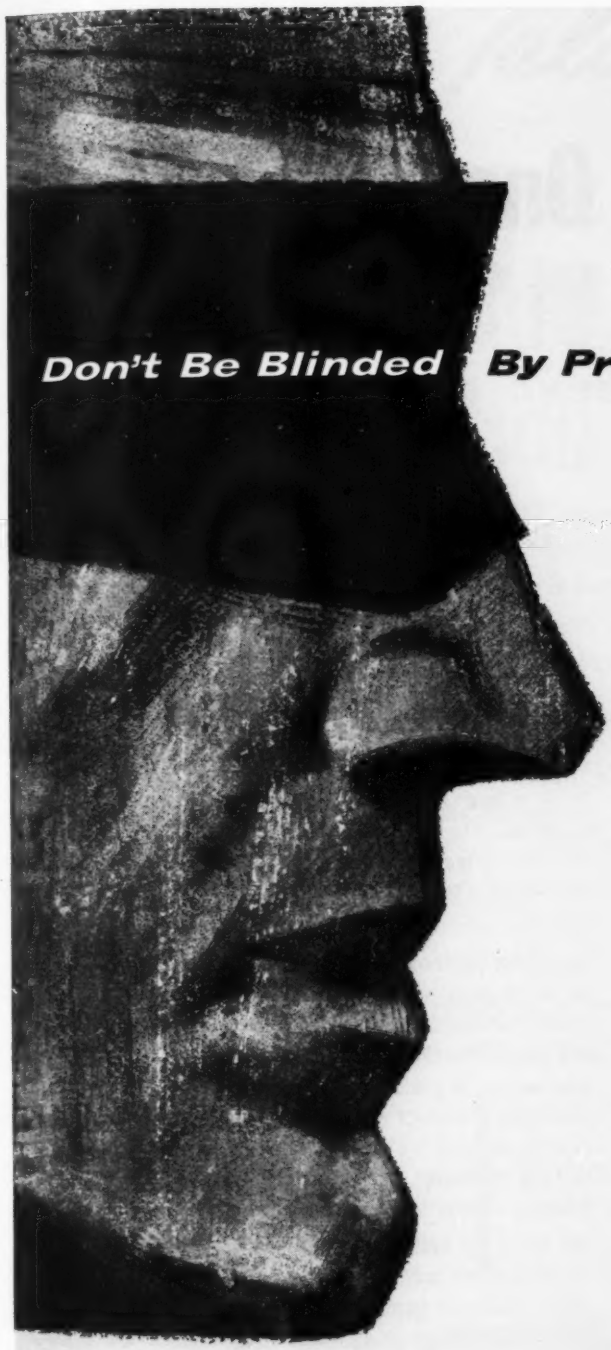
Two appointments in the Technical Development Division of the Technology Department of Crucible Steel Company of America have been made known. **A. E. Nehrenberg,** formerly research supervisor, has been named section manager of technical development, and **R. W. Metter,** formerly with Crucible's Titanium Division, has been appointed administrator of patents and licenses.

Promotion of **James A. Perham** to chief engineer of Thor Power Tool Company's SpeedWay Mfg. Co. Division, has been announced. Formerly chief product engineer of Thor's Aurora (Ill.) Works, he will work with **A. E. Feiereisel,** vice president of engineering at SpeedWay.

New superintendent of the Gage Division of Pratt & Whitney Co., Inc. is **Chrysostom B. Blanchard.** He replaces **Harold G. Lucas,** who retired. **Albert M. Dexter** has been named director of metrology and will direct activities concerned with measurement in the Gage Division.

Election of **Marvin S. Bandoli** as senior vice president of Pendleton Tool Industries, Inc., has been announced by the company.

. . . continued on page 29



Don't Be Blinded By Price--

Always look for True Value!

Naturally price is a factor to be considered — a very important one, too — when you're weighing the quotations of various gage manufacturers.

Don't let price be your only guidepost, however. Look beyond actual dollar and cent figures . . . be certain you're getting true value before you buy. Remember, the eventual cost of any gage depends on the reliability of your supplier, on the wear life and precision built into the gage itself and on the per piece inspection time required.

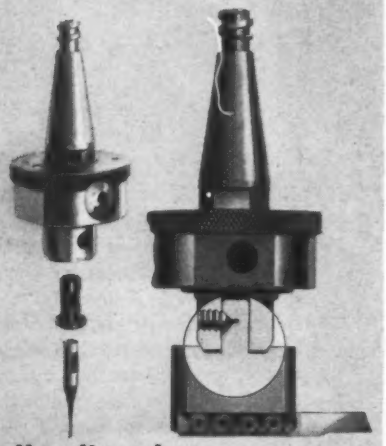
At Pipe Machinery our modern craftsmen are dedicated heart and soul to the theory that there's no substitute for quality, accuracy and service . . . that the best gage in the long run is always the most economical. For the highest precision — at a fair price — always look to Pipe Machinery. Whatever your time requirement, you can be certain you'll receive your order when you need it.

When you are in the Cleveland area, stop in and see us.

THE PIPE MACHINERY COMPANY • *29100 Lakeland Blvd.* • *Wickliffe, Ohio* • *Greater Cleveland*

CIRCLE INFORM-A-GRAM KEY NO. 27

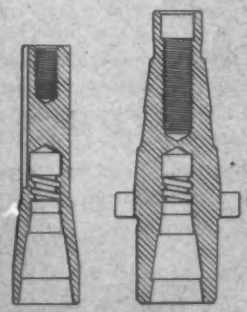
Packaged Set
includes boring chuck, reducer bushing, extension bar and tool bits.



How it works

Holes from 5/32"... Note ½"–⅜" reducer bushing for either ½" or ⅜" shank holes.

To 5" holes... Here ½" shank is merely a drawback to use nose end of chuck for stiffness.



Bridgeport Millers
can utilize Moore Boring Chuck Set by means of shank adapter at left. Another Moore adapter (right) fits machine spindles with No. 40 tapers.

One Moore Boring Chuck Set bores any hole from 5/32" to 5"

Here's an ideal way to hold down your investment in boring machine accessories. The unique Moore Boring Chuck Set is like three sets in one...boring the complete range of holes from 5/32" to 5". And with just one chuck for both tool bit shank sizes, you save chuck-changing time, too.

Dependable Moore-quality workmanship and design show in every detail of the chuck and tool bits. To insure years of accurate use, all chuck components, including the adjusting lead screw, are hardened and ground. The chuck is completely dust-protected, and its large, clear dial has 50 graduations...increases hole .001" in diameter per graduation. The chuck will start behind center for small holes and move to ⅜" plus. It's easy to unclamp, move and reclamp slide in exacting increments. One wrench fits all screws. The tool bits are available in either high speed steel or carbide-tipped.

And here's the best news of all! Originally designed for use with Moore Jig Borers only, this completely packaged boring unit can now be purchased with appropriate shank adapters to permit its use with all Bridgeport Millers or any machine with a No. 40 Taper.

For further information and complete ordering instructions, just drop a line to...

Moore Special Tool Company, Inc.

726 Union Avenue, Bridgeport 7, Connecticut

ADD MOORE TOOLS TO YOUR TOOLROOM

JIG BORERS • JIG GRINDERS • PANTOGRAPH WHEEL DRESSERS • PRECISION ROTARY TABLES • HOLE LOCATION ACCESSORIES

CIRCLE INFORM-A-GRAM KEY NO. 28

. . . Men from page 26

Recent appointments by Brown & Sharpe Mfg. Co. include **William P. Sheffield,** assistant to the general manager; **Frank E. Montie,** superintendent of the High Speed Steel Group; **T. Russel Hall,** assistant superintendent, High Speed Steel Group; **Patrick G. Lindemann,** department foreman, machining sections; and **Dimitri Yasinezuk,** supervisor of quotation section for High Speed Steel Cutting Tools.

Albert H. Dall was recently appointed chief engineer of the Machine Tool Division of The Cincinnati Milling Machine Co. He will coordinate all engineering activities of the Milling Machine, Grinding Machine, Electro-Hydraulics, and Special Machine Tool Divisions. He will also be responsible for the Development Research Laboratory.

Appointment of **John F. Murray** to chief product engineer for Pesco Products Division and Wooster Division, Borg-Warner Corp., has been announced. Formerly manager of product engineering at Pesco Products, he will now coordinate all engineering activities for research and development, product engineering, and production.

New director of engineering at Heli-Coil Corp. is **Karl H. Epple.** At the same time, **Edward W. McLaren** was named director of manufacturing.

Promotion of two engineers to administrative positions with Tube Reducing Corp. have been revealed. Chief methods engineer is **Frederick P. Huston** and chief product engineer is **Scott N. Randall.**

Now serving as general superintendent of production for Philco Corporation's Government and Industrial Division is **George Masurat.** He is responsible for production operations for the Terrier missile fuse, Transac computers, Signal Corps radio relay equipment, and Sidewinder missile.

George C. Kirker has become plant manager of the Montebello Division of Western Design & Mfg. Corp.

Three appointments in the Central Engineering Division at Consolidated Electrodynamics Corp. are **Francis T. Greenup,** manager of engineering services and manager of the Alecra Dept.; **George M. Slocomb,** assistant chief development engineer; and **E. James Penrose,** administrative manager.

. . . continued on page 33

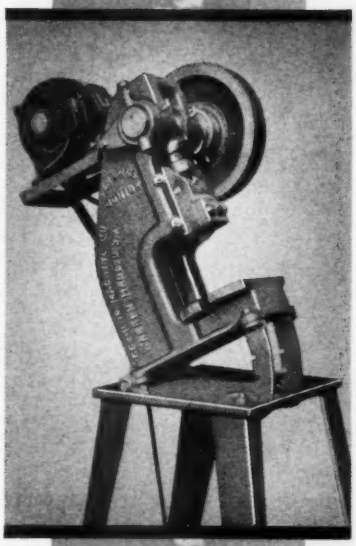
Talon and

PERKINS PRESSES

are Synonymous with *PROGRESS*

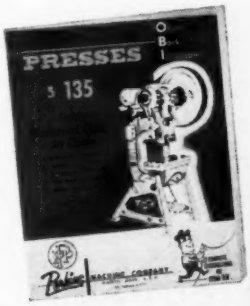
Putting ZIP into a world renown product demands an unfailing dependable source of operation at lowest possible over-all cost.

Perkins Presses have been selected by many of the nation's largest manufacturers because they represent the ultimate in press design and are built to the highest standards for strength, rigidity, endurance, accuracy and power.



THERE IS A PERKINS PRESS TO MEET EVERY REQUIREMENT

For FORMING
BENDING
NOTCHING
PUNCHING, etc.

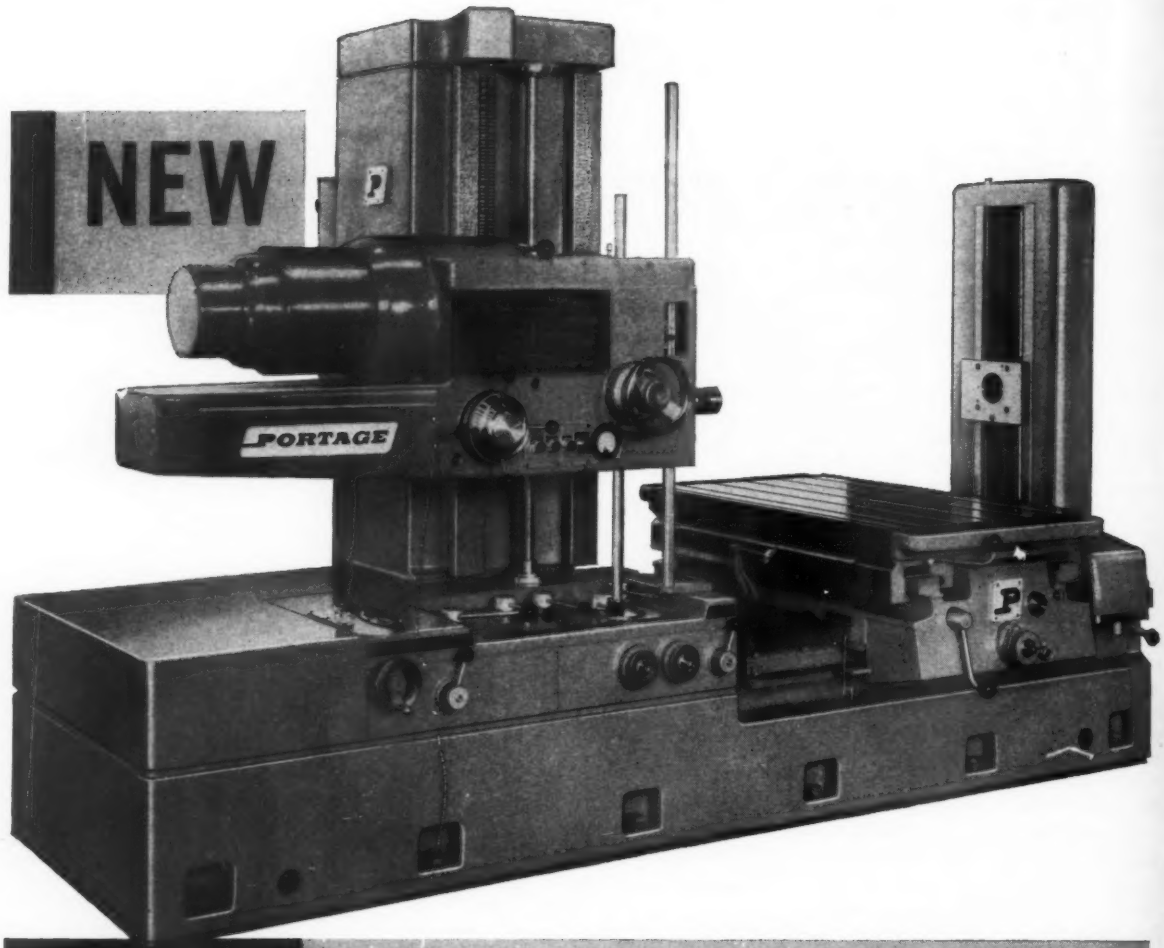


Write Dept. TP-4 for complete technical information

Write us about YOUR requirements.
Our engineers will be glad to help YOU.

PERKINS
MACHINE COMPANY
WARREN, MASS., U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 29



PORTAGE...3" diameter horizontal milling, drilling and boring machine

Literature, just off the press, covers features and specifications.

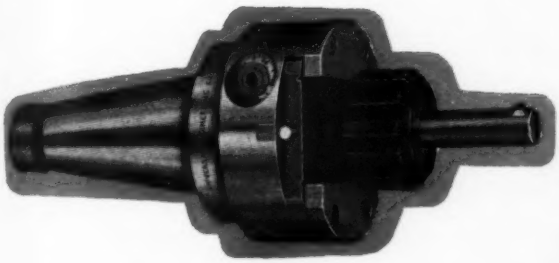
Mr. Buyer... here's a 3 inch bar machine you can't afford not to investigate. It's new from the top of the column to the bottom of the base... All new speeds and feeds, plus a versatility of job applications make it a real money maker. All new construction features offer a truly strong, rugged machine... and the pay-off... it's priced amazingly low, every shop can afford one ...write, wire or phone for complete information.

THE PORTAGE MACHINE COMPANY

1036 SWEITZER AVE., AKRON 11, OHIO
PORTAGE 2-0211 TWX AK268

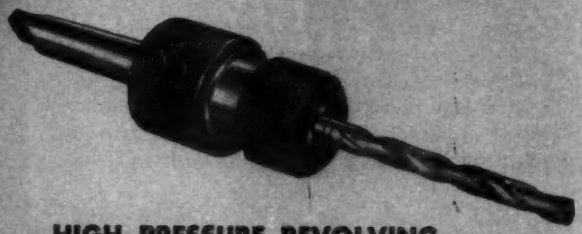
BUILDERS OF PRECISION MACHINE TOOLS, SPECIAL AND PRODUCTION MACHINERY SINCE 1916

CIRCLE INFORM-A-CRAM KEY NO. 30



UNIVERSAL BORING CHUCK is heavy and rigid for all types of rough boring without chatter yet accuracy of adjustment adapts it equally well to finish boring. Time-tested Universal Collet nose holds boring tool much more rigidly and securely than set screws while precision and extreme accuracy of feed-adjustment are obtained by an anti-backlash arrangement of feed screw and large dial.

UNIVERSAL RELEASING TAP CHUCK has same basic collet principle featured in all Universal Collet Chucks. Screws or sleeves are not needed and collets are interchangeable with other Universal chucks. Simple, compact design has no springs, cams or pawls to break or wear. Can be used for either right or left hand tapping without adjustment.



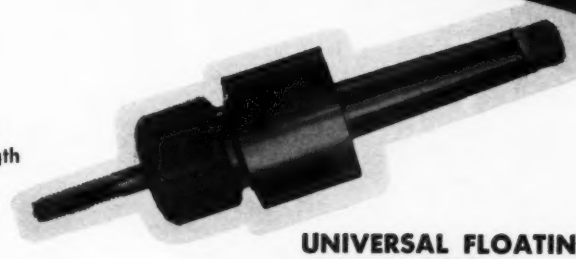
HIGH PRESSURE REVOLVING COOLANT TRANSFER CHUCK has standard Universal Collet Chuck nose and a variety of shank sizes can be held by simply changing collets. Minimum overhang is made possible by the single face seal design. Back pressure principle of this design prevents "brake" action thus lowering torque on spindles. Chucks for higher speed and pressures than standard plus a variety of mountings are also available.

UNIVERSAL
COLLET CHUCKS

combine maximum holding power and minimum run out with simplicity of design and low price

The basic collet principle is the same in all Universal chucks. Tools gripped in these chucks withstand a maximum thrust and radial load because the collet grips on a continuous surface its full length and positively locks the tool. Write today for new catalog showing the complete line of Universal collets and chucks.

210



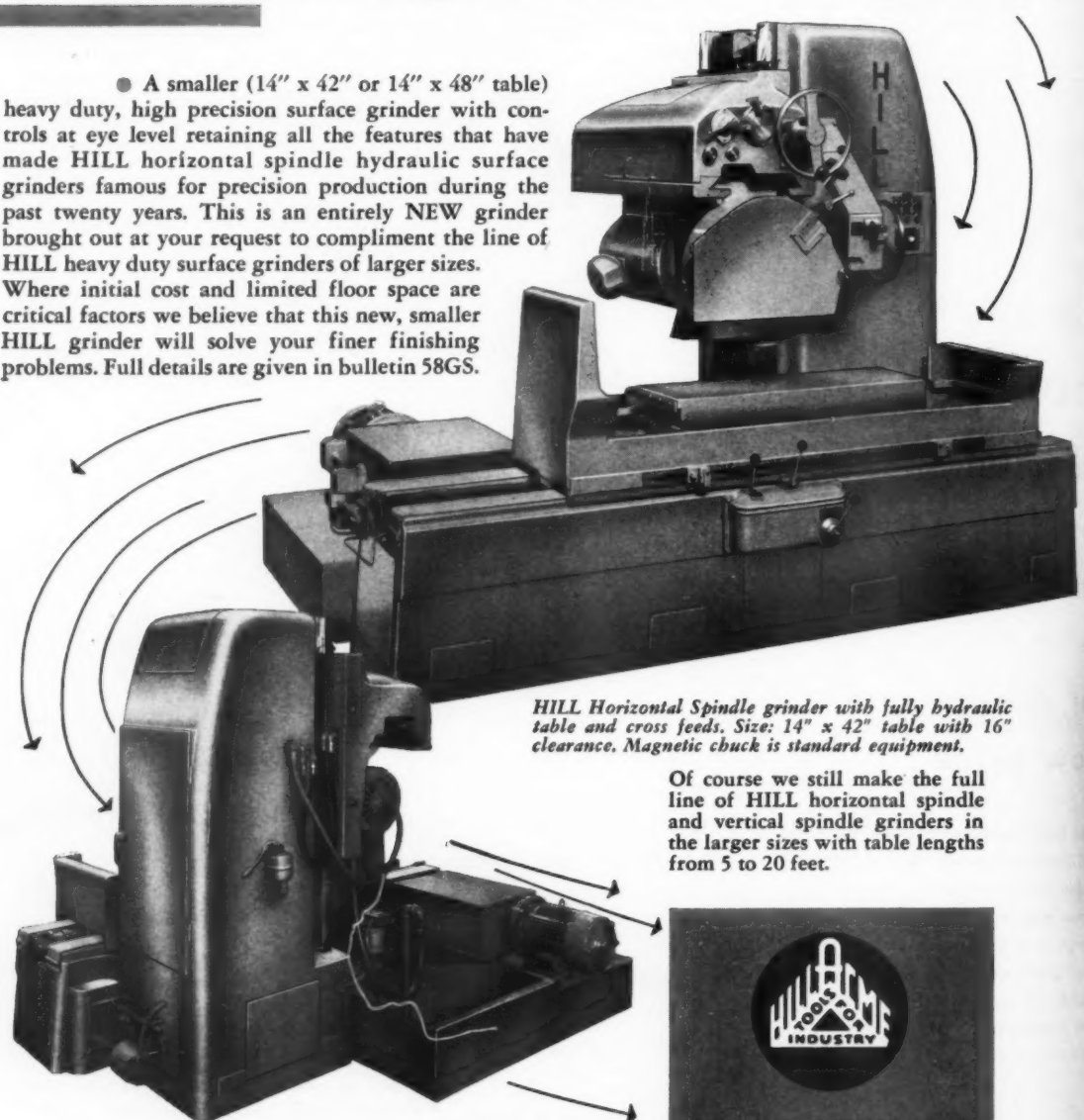
UNIVERSAL FLOATING COLLET CHUCK for horizontal or vertical operation is positively protected against destructive action of coolant by a seal which prevents entrance of compounds into interior of assembly. Frictionless ball bearing flat springs are adjustable to counter-balance weight of the tool.

UNIVERSAL ENGINEERING COMPANY FRANKENMUTH 8, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 31

HERE IS THE GRINDER YOU ASKED FOR!

● A smaller (14" x 42" or 14" x 48" table) heavy duty, high precision surface grinder with controls at eye level retaining all the features that have made HILL horizontal spindle hydraulic surface grinders famous for precision production during the past twenty years. This is an entirely NEW grinder brought out at your request to compliment the line of HILL heavy duty surface grinders of larger sizes. Where initial cost and limited floor space are critical factors we believe that this new, smaller HILL grinder will solve your finer finishing problems. Full details are given in bulletin 58GS.



HILL Horizontal Spindle grinder with fully hydraulic table and cross feeds. Size: 14" x 42" table with 16" clearance. Magnetic chuck is standard equipment.

Of course we still make the full line of HILL horizontal spindle and vertical spindle grinders in the larger sizes with table lengths from 5 to 20 feet.

HILL ACME TOOLS FOR INDUSTRY

Manufacturers of: "HILL" Grinding & Polishing Machines — Hydraulic Surface Grinders — "ACME" Forging — Threading — Tapping Machines — "CANTON" Alligator Shears — Billet Shears — "CLEVELAND" Knives — Shear Blades

THE HILL ACME COMPANY

1207 W. 65th STREET
CLEVELAND 2, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 32

. . . Men from page 29

Waters Mfg. has added **Fred E. Dole** to its engineering staff as special designer and consultant.

Head of the Retaining Ring Division of Ramsey Corp. is **Kenneth T. Walden.**

Lindberg Engineering Co. has announced the appointment of **Ray P. Dunn** as technical director of Lindberg Melting Furnace Division.

Appointment of **E. S. Evans** as engineer-in-charge, Project Section, and **R. E. Ferber,** supervisor, Production Planning Section, has been announced by Allis-Chalmers Steam Turbine Department. **Rene V. Elicano** has been appointed as operations research engineer in the Production Control Department of the West Allis Works.

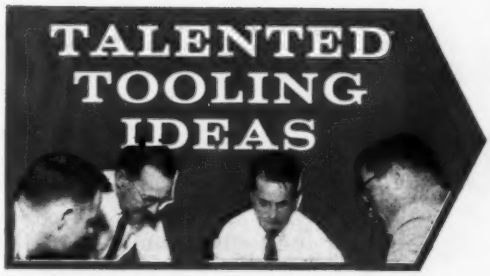
William E. Oswalt has been named general manager of the Direct Current Motor and Generator Department at Erie General Electric. He was formerly general manager of the General Purpose Control Department in Bloomington, Ill.

NEW FLARING TOOL RESISTS WEAR

A new tube flaring tool that has flared over 260,000 small stainless steel tubes without regrinding or apparent wear, has been devised at Rohr Aircraft Corp. to eliminate regrinding problems. Only two cleanings were required during this time to remove a slight buildup of metal, and continued service is expected.

To make the tool, a hard carbide lathe center nib was inserted in a steel tool body in which a ⅝" dia hole was drilled. The nib, a Kennametal Grade K6, was then brazed in place and ground to a 74° point angle.

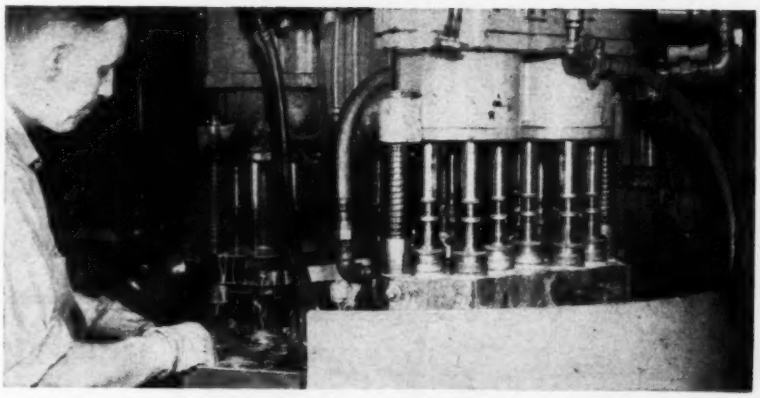
In the tube flaring operation — performed on a Leonard tube flaring machine — the rotating flaring tool, offset slightly from center, is fed into the end of the tube. Similar applications are being extended for flaring larger tubes.



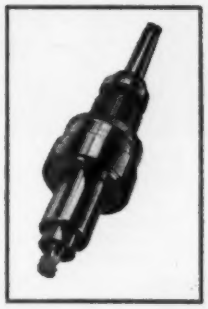
FROM SCULLY JONES

SCULLY-JONES AND CO., 1913 S. ROCKWELL ST., CHICAGO 8, ILL.

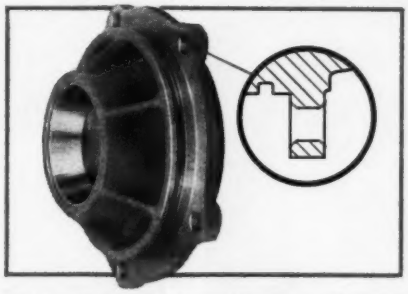
Automatic recessing tools simplify back-chamfering operation on multiple-spindle drill!



Here's how Baker Brothers, Inc. designed a simpler machine for drilling, reaming, and chamfering five holes in each of two parts for the Ford Chassis Parts Plant, Sterling, Michigan.



Retainer and bearing cup assembly forgings are drilled and reamed in this four-station machine—then Scully-Jones Automatic Recessing Tools (five in a cluster for two different size bolt circles) feed down to chamfer top and bottom edges of the holes. Chamfering cutters easily fit inside the reamed holes, and when the stop collar of the recessing tool contacts the face of the fixed pilot bushing, radial feed is automatically actuated and controlled by a lead cam within the tool.



Handling of the piecepart has been minimized. The operator just loads and unloads two different parts. Scully-Jones Recessing Tools eliminate the need for turning the work to deburr and chamfer bottom edges. Perhaps you can make major capital equipment savings by using Scully-Jones Automatic Recessing Tools for doing intricate machining operations on drill presses, radial drills, turret lathes, and chucking machines. Adjustments for controlling location and depth of cut are simple, fast, and accurate. Eccentric cam action produces a positive feed. Positioning of the cutter and the cutting cycle itself are fast, efficient operations that assure a high rate of production. Changing tool bit holders or circular form cutters easily adapts your S-J recessing tool to do complex operations, like cutting reliefs, grooving, chamfering, back-facing and counterboring, necking, boring, or a combination of these.

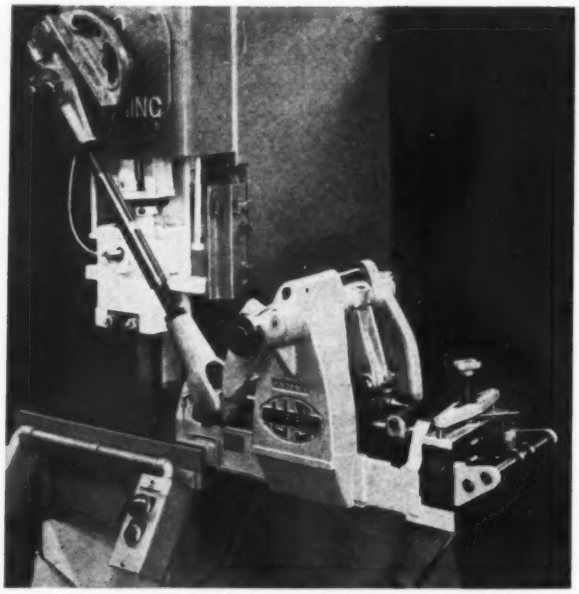
Write for Bulletin 10-50 describing typical recessing jobs. You'll get a complete check list for investigating possible applications in your shop.

CIRCLE INFORM-A-GRAM KEY NO. 33

Automatic Feeding for punch press profit!

Short run jobs—produced with long-run economy on the new U. S. SLIDE FEEDS.

NEW U. S. SLIDE FEED features reduce press room costs . . . increase production because . . .



Special S. F.-68A U. S. Slide Feed. Set-up for Feeding right to left on press with front to back crankshaft.

LESS TIME NEEDED FOR CHANGEOVER.

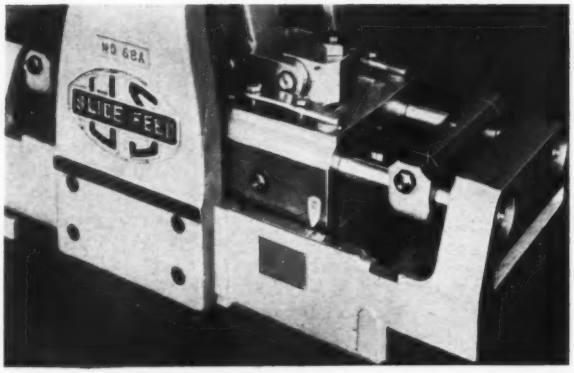
QUICK, VISUAL FEED LENGTH SETTING.

SIMPLE STOCK THICKNESS ADJUSTMENT.

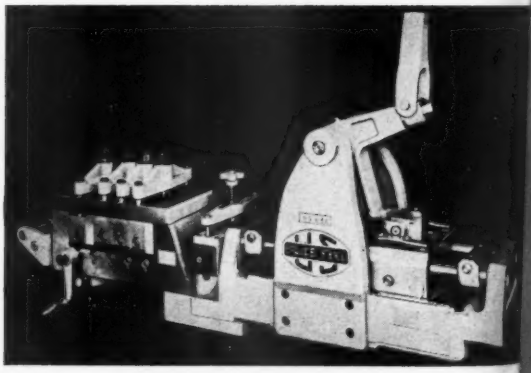
UNSURPASSED ACCURACY
(with or without pilots).

MORE POSITIVE CHECK.

Close-up of S. F.-68A U. S. Slide Feed showing indicator on feed block and scale on body, used for rapid feed length adjustment.



S. F.-68A U. S. Slide Feed with S. S.-27 U. S. Plain Stock Straightener. Conventional arrangement for feeding from left to right.



For complete information about the new U. S. Slide Feeds, write for Bulletin No. 101. Information concerning other U. S. Press Room equipment is yours by asking for Bulletin No. 85P.

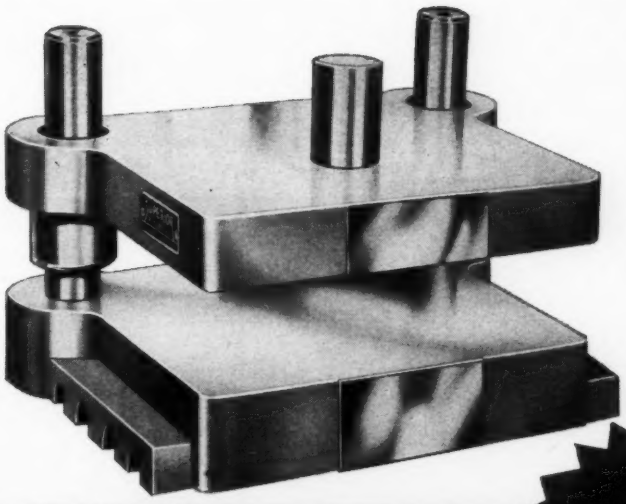
PRODUCTS

U. S. TOOL COMPANY, INC.

AMPERE *(EAST ORANGE)* NEW JERSEY

U. S. Multi-Slides® • U. S. Multi-Millers® • U. S. Automatic Press Room Equipment • U. S. Die Sets and Accessories

CIRCLE INFORM-A-GRAM KEY NO. 34



SUPERIOR DIE SET Exclusives

SAVE TIME AND CUT OVERALL DIE MAKING COSTS!!

No fumbling or wasted time with large or small die sets when you use Superior. Assembly and disassembly of these precision sets is rapid. In addition they provide safety insurance . . . protection for the skilled hands of die makers and handlers . . . protection also against the ruining of costly dies in handling, or even damaging valuable press equipment.

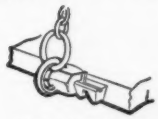
All Superior Die sets are jig bored to your specifications—result number of die set sizes practically limitless.

Add to this such outstanding features as *Precision Center Marks, Long and Short Bushings, Superfinish Pins* and you can see why Superior is your best die set buy.

Write today for 24 page catalog.

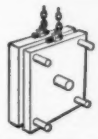
SAFETY FLANGE

protects fingers by providing roomy gripping space on either side of the die shoe.



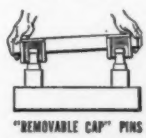
LOCK-JAW LIFTING DEVICE

removes the danger of handling large die sets.



E-Z LIFT SLING CHAIN

attach to the lock-jaw for immediate lifting.



"REMOVABLE CAP" PINS

End troublesome binding in parting dies.

For Fast Local Service Call These Expert Superior Representatives.

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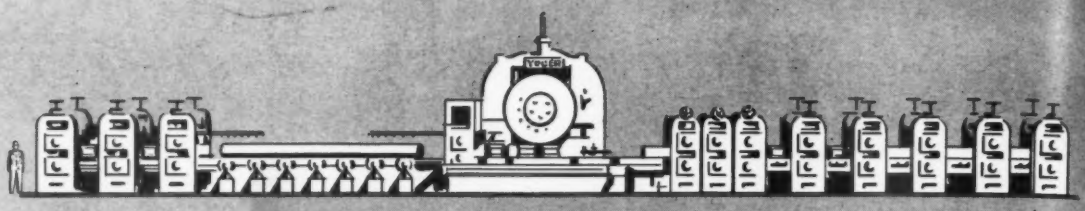
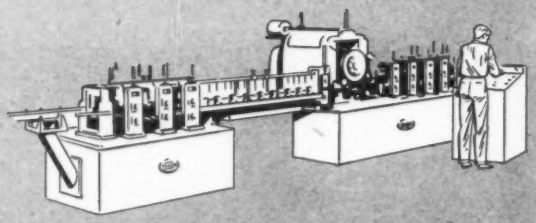
Indianapolis, Ind. Clifford 5-5668	Denver, Colo. Enterprise 234	Agawan, Mass. Republic 9-1132
Rockford, Illinois 3-3931	Winter Park, Fla. 4-0464	Brooklyn, N. Y. Esplanade 6-1368
Dayton, Ohio Hemlock 6209	Racine, Wis. Melrose 2-1900	Cheshire, Conn. Browning 2-4887
Minneapolis, Minn. Franklin 1-1321	Cedar Rapids, Ia. Empire 2-7831	Warwick, R. I. Turner 4-2907

SUPERIOR STEEL PRODUCTS CORP. 2754 South 19th St. Milwaukee, Wis.

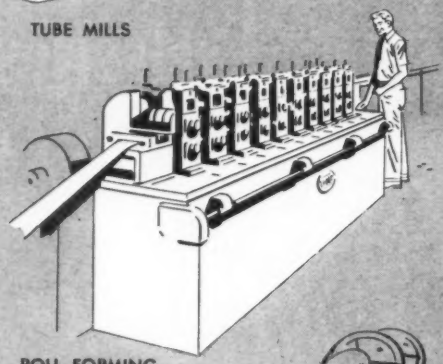
CIRCLE INFORM-A-GRAM KEY NO. 35



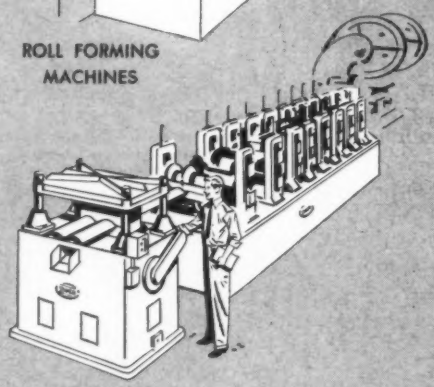
PIPE MILLS



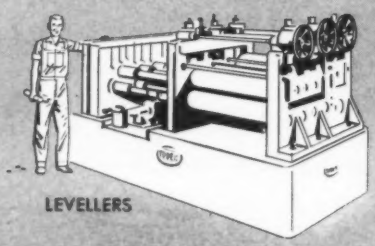
TUBE MILLS



ROLL FORMING MACHINES



CUT-OFFS



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Uncoilers, slitters, roll-forming machines, cut-offs, pipe and tube mills, special machinery for ferrous or non-ferrous metals are all made and engineered by Yoder to fit your specific requirements.

Special attachments and auxiliary units can perform additional operations such as welding, coiling, punching or embossing without extra labor cost while increasing production speed.

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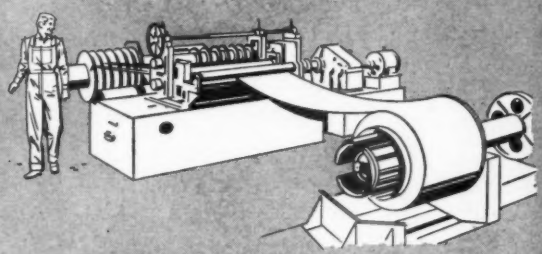


RECOILERS SLITTERS UNCOILERS

ENGINEERING **YODER** MANUFACTURING

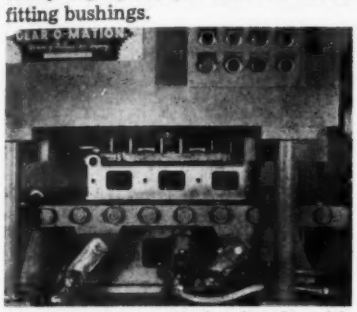
PIPE AND TUBE MILLS (ferrous or non-ferrous)
COLD ROLL FORMING MACHINES
ROTARY SLITTING LINES

CIRCLE INFORM-A-GRAM KEY NO. 36

VERSATILE RAM MACHINE PRESSES BUSHINGS IN ENGINE CYLINDERS

A recently developed hydraulically-operated, electrically-controlled machine simultaneously presses valve guide bushings into engine cylinder heads. The machine press-fits the bushings at a pre-determined force into any one of two, three, or four diesel-engine cylinders of two types — in line and v-type — with the three and four cylinder models having either two or four valves on each cylinder.

This machine, built by Gear-O-Mation Division of Michigan Tool Co., also provides a visible and audible indication (signal light and bell) of any improperly positioned or loose fitting bushings.



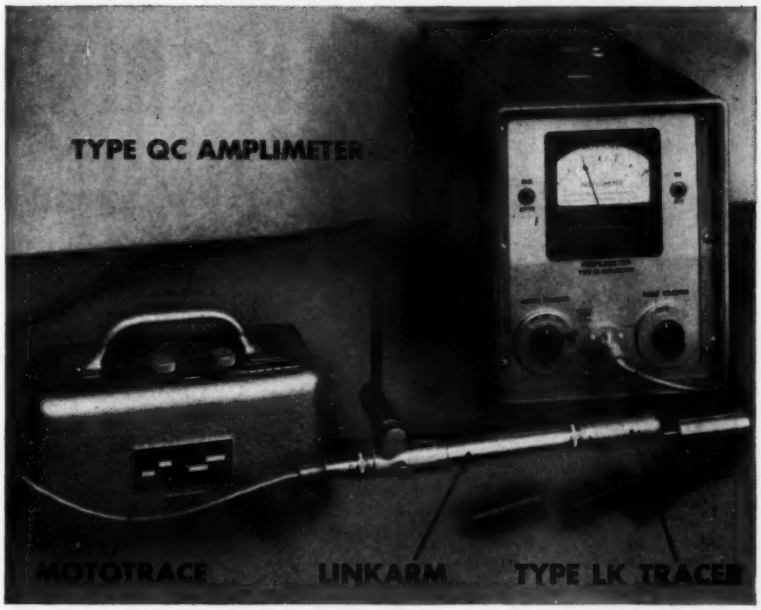
In operation, cylinder heads with the bushings held in place by a pilot plate are manually roller fed to a hydraulically-operated end-stop positioner. Each positioner is adjustable to provide for the different cylinder heads. The work cycle is entirely automatic. The table and work lower to the press position where, if the work is positively positioned, it makes contact with a limit switch controlling the ram action.

Each ram is powered from a 3⅝" stroke, 2" dia hydraulic cylinder. Only those rams, pre-designated by a selector switch, lower to press-fit the valve-guide bushings of the particular cylinder head being run. While it is possible to operate all rams simultaneously, the machine is usually set to call for the rams to move down in sequence. The advantage is a fairly sizable saving in maximum power requirements. The time loss is negligible.

As the rams return to their dwell position, they actuate a pressure switch-controlled circuit that raises the work and table to an easy-exit position for movement to a roller conveyor feeding a transfer machine.

The illustration shows the head of a 3-cylinder model, as it is fed to the machine with the bushings positioned and held by the pilot plate. Limit switches check position and start the automatic cycle.

NEW! Profilometer® GROUP III



Measures Roughness of Surfaces from ⅛" to Flat — ID and OD

THIS shop equipment handles an exceptionally wide range of roughness measurement—with *proven Profilometer accuracy.* It is lightweight and portable — built for use by shop personnel — and includes the following items:

NEW Type LK Tracer — Measures on ID's and OD's as small as ⅛" — flats — tapers — narrow splines — gear teeth. Passes through a ¾" hole.

NEW Type QC Amplimeter — Shows roughness from 0 to 1000 microinches (arithmetical or r.m.s.) on an easy-to-read meter. Has 3 standard roughness width cutoffs. Factory-calibrated for dependability.

Mototrace and Linkarm — Give the Tracer a steady support and smooth motion, essential to dependable measurement. No operator skill required.

FREE LITERATURE gives details. Write for it. And, without obligation, let us arrange for a demonstration in your plant. We have representatives in principal industrial centers throughout the Free World.

Remember: You can DEPEND on the PROFILOMETER — first in surface roughness measurement since 1936.

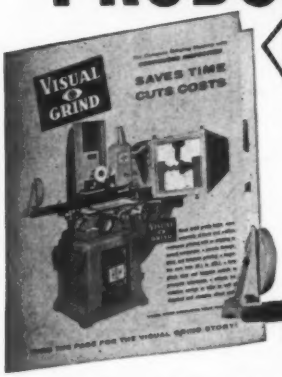
Profilometer is a registered trade-mark.

MMC® MICROMETRICAL MANUFACTURING COMPANY

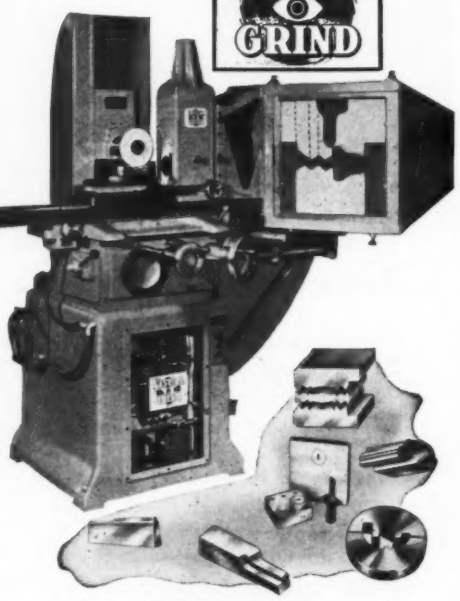
339 S. MAIN ST. ANN ARBOR, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 37

FREE BROCHURE TELLS HOW YOU CAN GRIND PRECISION HIGH PRODUCTION DIES



VISUAL GRIND



IMPORTANT TO YOU!

Free booklet tells how VISUAL GRIND facilitates construction of precision high-production dies, dies for powder metallurgy, lamination dies and special purpose dies. VISUAL GRIND permits through, blind and templet grinding . . . permits continuous inspection by magnifying work from 10:1 to 100:1 . . . upgrades semi-skilled labor . . . permits easy maintenance of dies in your own plant . . . reduces costly down time. VISUAL GRIND COMPLETES YOUR TOOL ROOM.

Visual Grind solves the problem in mind

Intricate grinding jobs like those shown above ordinarily involve several machines. ALL WERE FORM GROUND ON A SINGLE VISUAL GRIND.

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Please send me the free brochure describing the capabilities of the VISUAL GRIND.

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Company .....

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CIRCLE INFORM-A-GRAM KEY NO. 38

Derek Richardson is the newly appointed vice president of aluminum sales, Metals Division of Olin Mathieson Chemical Corp. He was formerly sales manager of the corporation's Industrial Chemicals Division.

The Cincinnati Division of Bendix Aviation Corp. has made known the appointment of **Henry B. Yarbrough** to the new post of general sales manager. He previously served as director of sales, military products, for the Radio Division.

New sales manager for the Cutting Tool and Gage Division of Pratt & Whitney Co., Inc. is **Alford H. Johnson.** Instrument gage sales for the country will be managed by **William C. Mullin.**

The following appointments were announced recently by Firth Sterling Inc.: **Kenneth E. McKown** is sales representative in the Pittsburgh District and will cover the Buffalo, Rochester, and Elmira, N.Y. territory; **Robert B. Ahart** serves in the Southwest District, covering the Dallas territory; and **Robert C. Wilkinson** has been assigned to the Southern District, covering Florida, Georgia, and South Carolina. **J. Mabon Childs** and **Stephen F. Madden** are now assistant managers for the Steel Sales Division.

The promotion of **James L. Whalen** to vice president and sales manager was recently announced by Eclipse Air Brush Co.

Robert W. Titgemeyer now serves as branch manager of the Los Angeles territory for The Carpenter Steel Co.

West Coast factory representative for Optical Gaging Products, Inc. is **Bernard A. Shedden.**

Newly appointed vice president in charge of sales for the Landis Tool Co. is **Walter P. Lotz. John A. Cover** takes over as sales manager and **John J. Keane** as assistant sales manager.

Announcement of the appointment of **A. A. Milkie** to manager of the Chicago District of the Pangborn Corp., has been made known.

James C. Darby has been appointed general sales manager for The Truarc Retaining Rings Division of Waldes Kohinoor, Inc. He will be responsible for the sales and marketing of all products manufactured by this division.

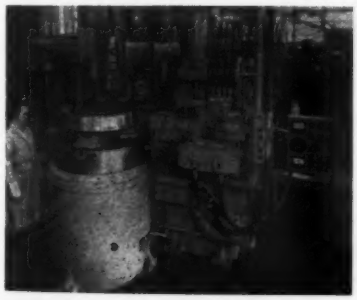
Taking over as sales manager of Gorham Tool Co. is **John T. Bennett.** He will direct the sales, engineering, and service activities of the field representatives, from the Detroit office.

New appointments for Kaynar Mfg. Co., Inc. include **Kenneth D. Davis,** domestic and international sales manager of the Kaylock Division; **Robert H. Randall,** general manager of the Kaylock Division; **Victor Hassell,** eastern regional sales manager; and **J. O. King** and **Henry J. Amigo,** regional representatives.

James A. Cloutier has joined the Chicago sales organization of Bay State Abrasive Products Co., and will serve in the northern Indiana territory.

TRACER-CONTROLLED LATHE FINISH-TURNS RAILROAD CAR WHEELS

A tracer-controlled high speed lathe, that uses insert-type carbide tools to finish-turn a variety of rough cast or forged railroad car wheels, has been designed and built by Snyder Tool & Engineering Co.



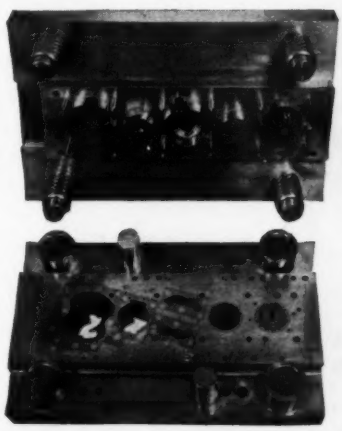
Thirty-three to 42" dia wheels weighing up to 800 lbs are processed in a 2 min, 15 sec machining cycle.

Hydraulic controls include six pumps driven by a 15- and a 20-hp motor; a tracer system operated by a template-controlled servo valve with a mechanical follower; and hydraulic cylinders that operate a three-jaw chuck.

Compound slides, a special clamping arrangement, and tracer cam settings for different wheel diameters, are also features of the automatically lubricated machine.

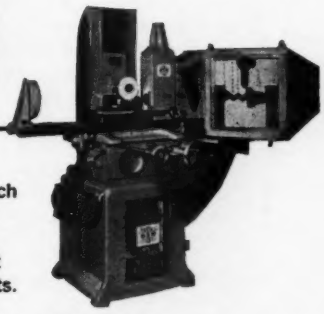
DO YOU REQUIRE PRECISION HIGH-PRODUCTION DIES?

CLEVELAND TOOL and DIE COMPANY SOLVES YOUR PROBLEMS and meets your most exacting tool and die requirements. Cleveland Tool and Die Company has built individual dies which have produced millions of precision tolerance pieces without retooling. SEND FOR THIS FREE BROCHURE DESCRIBING OUR FACILITIES.



FREE Brochure
Describes Facilities
available. Send for your free copy today. No obligation, of course.

Typical lamination die custom-made at Cleveland Tool and Die Company. Dies like this, dies for powder metallurgy and other special purpose dies are made by skilled craftsmen using the most modern techniques and facilities.



Typical of the modern facilities employed is VISUAL GRIND, which permits contour grinding of your dies without stopping to consult a comparator. Eliminates stop and start grinding, saves time, cuts die costs.

CLIP and MAIL THIS COUPON TODAY

CLEVELAND TOOL and DIE Co.
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Please send me the free brochure describing the facilities of CLEVELAND TOOL & DIE COMPANY.

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Company .....

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CIRCLE INFORM-A-GRAM KEY NO. 39

new
FORD
solid carbide
END MILLS

WHY THEY DO YOUR JOB BETTER

All Ford end mills are *precision machine ground from the solid* . . . which insures uniformly accurate flute form and a constant relief angle. On your job, that means more parts per grind. So you save labor on grinding and tool changing. You save on replacements. You save on downtime. What's more, there's less time per part, more parts per hour, fewer rejects. Available in 11 types . . . all standard, and *available.*

Rotary FORD Tools

BULLETIN 510 FREE AND LATEST PRICES . . . WRITE TODAY

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DAVENPORT, IOWA

Precision manufacturer of H. S. S. and Carbide Rotary Files and Cutters • Countersinks • Grinding Burrs • Special Tools • Factory Regrinding

CIRCLE INFORM-A-GRAM KEY NO. 40

MANUFACTURING MEMOS

Shine 'Em Up . . . Apple polishing is not one of the things that can be handled by the Syntron Lapping-Polishing Lab. Manufacturers and laboratories who have small amounts of lapping and polishing work, however, can send parts up to 37" dia to Syntron to be finished. Contact the company at 341 Lexington Ave., Homer City, Pa., for information.

Divided We Fall . . . The export market for American small tools may shrink because of the lack of U. S. activity in the development of international standards for small tools, warns Frank P. Brown, chief of the Shop Div'n, National Bureau of Standards. In Berlin recently, twelve countries showed interest in the standardization work of the International Small Tools Committee. Not so the U. S., which has a lot of sales to lose if standardization isn't adopted.

Another effort to unify and simplify—this time drafting practices—is cutting its own throat. George Nobel, head of standards department of the Dominion Engineering Works, Ltd., Montreal, believes "over simplification" could hurt drafting just as much as its present complicated practices.

Dollars Earned . . . There's a 50% to 60% saving in it for you, says The Dayton Rogers Mfg. Co., if you use its line of die-cut sprockets for roller chains, instead of the machine-cut type. They're furnished with or without shouldered hubs from 11-teeth to 80-teeth, in various roller chain sizes.

New Look . . . The "sack" isn't the new look adopted by Worthington Pump and Machinery Corp. It's the simplified name, Worthington Corp., and the modernized version of the winged "W" trademark, now a bold new "W."

First Round Winnah . . . "Tremendous possibilities" for the future of automotive gas turbines were revealed recently when Ford Motor Co. displayed an experimental gas turbine engine known as "702," says A. L. Hayes, director of engineering research and advanced product study at Ford. However, remarks Hayes, before gas turbines can compete with internal combustion and diesel engines, manufacturing costs must come down and efficiency must go up. A step in the right direction is the reduction of turbine wheel cost from several thousand dollars to less than a hundred.

A Dollar Saved . . . Radioisotopes are many of industry's biggest money savers these days. In the future, savings may climb as high as one billion dollars annually, reveals a National Industrial Conference Board study now in progress.

No Toys Here . . . There's plenty to see at the industrial-education exhibit center recently opened by Borg-Warner in Chicago. Not only can you look, but you can operate some of the eighteen exhibits which show scientific, industrial, and home developments, and B-W products and services.

A FULL YEAR OF CONTINUOUS OPERATION

SHOWS 100% PRODUCTION INCREASE,

REDUCED GRINDING COSTS AND DIAMOND WHEEL SAVINGS

MANCHESTER MACHINE & TOOL CO.
MANUFACTURERS OF THE
Manchester Cut-off & Grooving Tools
5142 MANCHESTER ROAD
AKRON 19, OHIO

SPECIALIZING IN PRECISION PRODUCTION

MILLING CUTTERS SPECIAL TOOLS

May 22, 1958

Hammond Machinery Builders, Inc.
1600 Douglas Avenue
Kalamazoo, Michigan

Attention: S. H. Miller, Grinding Machinery Manager

Dear Sir:

After almost one full year of continuous operation, we are pleased to report how well satisfied we are with the performance of the Model SCE-6 Electrolytic Oscillating Carbide Tool Grinder and Anocut supply unit. It has proven to be an even greater asset than we had originally expected. We have been able to record the following results:

1. Increase in production approximately 100% in several operations of our carbide cut-off tools, thus relieving a difficult backlog problem.
2. Reduced our labor costs about 35%, since the oscillating and electrolytic combination almost completely eliminates the possibility of damaging tools, which was common under conventional diamond grinding methods.
3. We have noticed a substantial saving in diamond wheel consumption during the past year.

As a result of our experience with the Hammond Model SCE-6 we are more than convinced that any expansion in our grinding department will certainly be more of the same type of equipment.

Very truly yours,

MANCHESTER MACHINE & TOOL CO.

Milton A. Novkov,
Treasurer

MAN:fs

Hammond
ELECTROLYTIC
OSCILLATING
GRINDER

HERE ARE THE FACTS

Model SCE-6

Many users report their Hammond Electrolytic Grinder installation paid for itself in a few months through increased production, faster and better grinding and reduction of 80% to 90% in diamond wheel consumption.

6", 7" and 10" Oscillating Grinders — 6" and 10" Chip Breaker Grinders and Combination Oscillating and Chip Breaker Grinders available. Write for catalog.

Hammond Machinery Builders INC.

1631 DOUGLAS AVE. • KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 41

SEE ALL THE WAY DOWN...
NEW, AO Spencer Vertical Illuminator allows stereoscopic magnification deep inside small diameter openings

The new Vertical Illuminator and the AO Spencer Cycloptic Stereoscopic Microscope make a unique team that can be the answer to your problem whether it's the inspection of detail in small diameter, deep hole borings, or delicate assembly of miniaturized parts where every move is critical.

This low-cost illuminator readily attaches to the Cycloptic to provide efficient, shadowless illumination deep inside small orifices...and the Cycloptic delivers realistic, erect, true three-dimensional magnification of the illuminated detail.

The remarkable long working distance afforded by Cycloptic (up to 7 inches when Vertical Illuminator is used with 53 and 59 Series) gives you *plus* advantages . . . permits ample room for large size objects or inspection and assembly tools.

Add this unit to your present Cycloptic or ask about low-cost Vertical Illuminator and Cycloptic stereoscopic microscope combinations.

American Optical COMPANY
INSTRUMENT DIVISION, BUFFALO 15, NEW YORK

Dept. K179
Please send me FULL INFORMATION on the NEW AO SPENCER VERTICAL ILLUMINATOR AND CYCLOPTIC MICROSCOPES
NAME_____
ADDRESS_____
CITY_____ ZONE____ STATE____

CIRCLE INFORM-A-GRAM KEY NO. 42

MANUFACTURING MEMOS

New Prexy
The Metallurgical Society of the American Institute of Mining, Metallurgical, and Petroleum Engineers elected Dr. John Chipman, Metallurgy prof at MIT, president, and Dr. Carleton C. Long, vice president, director of research, Zinc Smelting Division, Joseph Lead Co.

Division Formed
The Conveyorized Finishing System Division, formed recently by M-H Standard Corp., will specialize in the design and construction of the latest finishing techniques and equipment. Technical director of the division is H. H. Morrison.

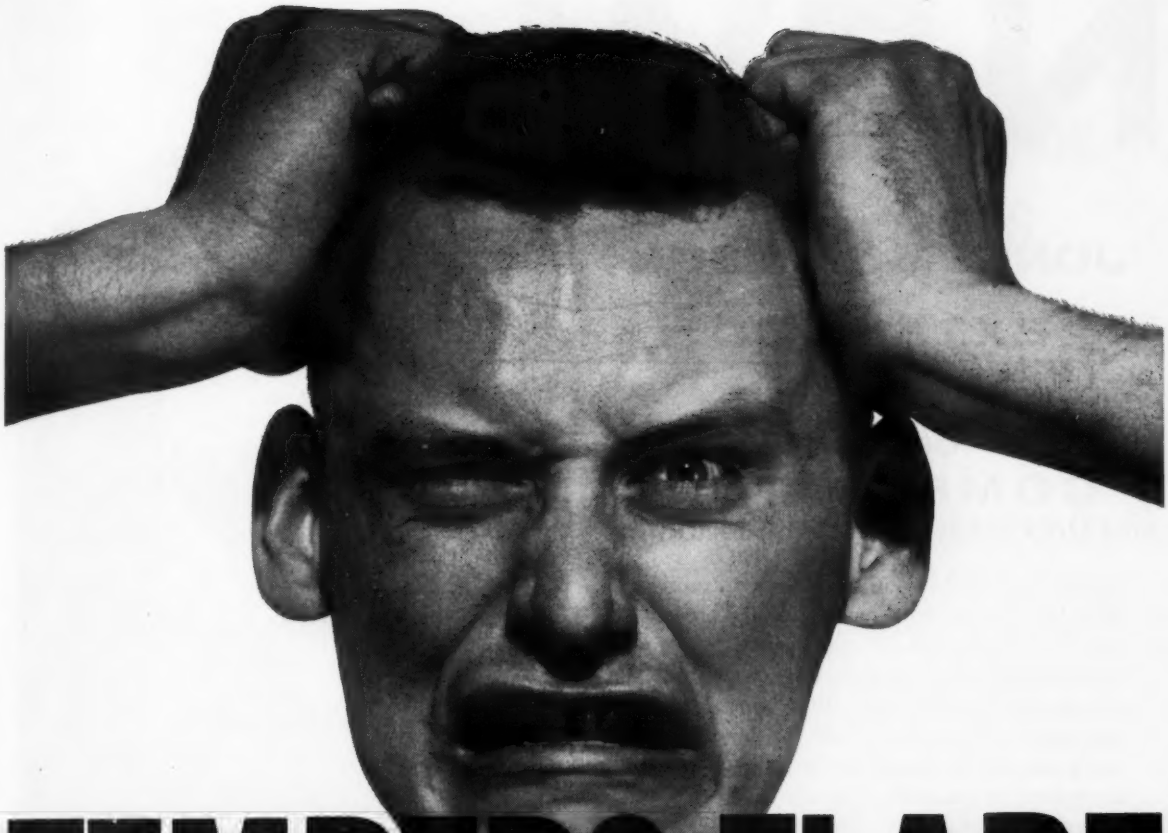
New Handle
Not only has the Detroit Screwmatic 750 changed hands from the Gear Grinding Machine Co. to Baker Brothers, Inc., but it will now be known as the Baker Automatic Bar Machine.

ASME Men
Honorary membership, the highest award given by the American Society of Mechanical Engineers, was recently extended to John Blizard, Howard Coonley, James Gleason, and Ernest L. Robinson.

"It'll Never Work"
While moving into its new 80,000 sq ft plant, Ransburg Electro-Coating Corp. remembered back about 20 years when electrostatic spray painting was considered impractical. Whoever said that should take a look at just a small part of the new facilities—16 conveyorized demonstration labs which handle test-painting of big and little articles.

Name Change
Because of its growing product line, National Forge & Ordnance Co. recently changed its name to National Forge Co.

Take Your Pick
Need more punch for meetings and training programs? Use one or more of the 147 films on machine tools and machining operations listed in a booklet published by the National Machine Tool Builders' Assoc. Average showing time is about 30 min. There's sure to be one to illustrate your point. Write NMTBA at 2071 E. 102nd St, Cleveland 6, for the film catalog.



TEMPERS FLARE

when strip-outs cause re-do's!

"Take any operation where assemblers must match-up tapped holes, avoid cross-threading, and drive machine screws into place—and you could be sitting on dynamite.

"When strip-outs occur (and they will), work stops or the piece must be removed from the line. The hole must be enlarged, re-tapped, a larger screw used, and you know what this means to employees working under a bonus plan.

"Or take the case of our *Portagraph* units," says MR. E. G. LAYER, ENGINEERING SUPERVISOR AT REMINGTON RAND SYSTEMS DIVISION IN TONAWANDA, N. Y. "Here, where plastic sockets are mounted, assemblers had to hold nuts in place under a steel sheet while screws were driven down from above. Get on the receiving end of bitter complaints about cut and bruised fingers, and you start looking for a better solution in a hurry."

The solution to both problems was simple. When Remington Rand switched to PARKER-KALON SELF-TAPPING SCREWS, these labor grievances quickly disappeared. If you'd like advice on proper types of fasteners for your product, a Parker-Kalon Field Engineer will be glad to be of assistance.

For light and heavy gage metals, ferrous and non-ferrous castings, bronze and brass forgings, structural steels, resin impregnated plywoods, woods, asbestos compositions, and plastics of all kinds, specify . . .

PARKER-KALON®
Self-tapping Screws

Sold everywhere through leading Industrial Distributors.

PARKER-KALON DIVISION, *General American Transportation Corporation, Clifton, New Jersey*

CIRCLE INFORM-A-GRAM KEY NO. 43

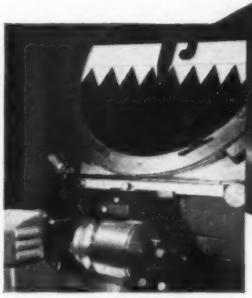
NEW

JONES & LAMSON EXTENDED RANGE OPTICAL COMPARATOR

and Universal Measuring Machine

Again, Jones & Lamson fills a long-standing need by introducing a new Comparator, the FC-30-ER, with 30″ dia. screen. It is designed especially to give *added measuring capacity* (up to 10″ horizontally, 8″ vertically), and *added work capacity* (200 lbs. and more, on a rugged 8″ x 32″ table, supported on precision rolls and twin heavy duty columns).

This new Extended Range J & L Comparator is *the largest standard 30″ Comparator made.* It includes J & L's True Telecentric Optical System, Adjustable High Intensity Illumination and Precision Matched Lenses.



The FC-30-ER, equipped with J&L's NEW Lead Amplifier, affords precise inspection of thread lead to .0001″. The Amplifier produces up to a 500:1 amplification of any lead error in threads ranging from 4 to 70 pitch.

MODEL FC-30-ER

"World's oldest and largest builder of precision optical comparators"

JONES & LAMSON

JONES & LAMSON MACHINE COMPANY, Dept. 710, 519 Clinton Street, Springfield, Vt., U. S. A.

Please send me Comparator Catalog GL5803, which describes the complete line of J&L Optical Comparators.

name _____ title _____ street _____

company _____ city _____ zone _____ state _____

CIRCLE INFORM-A-GRAM KEY NO. 44

MANUFACTURING MEMOS

Green Light

The go-ahead signal for ground breaking ceremonies for a $7.1 million flight test facility was given to Raytheon Mfg. Co. With the Navy's Bureau of Aeronautics' contract in hand, the company will begin development of electronic devices.

Coming Events

Nov. 5-6. Society of Automotive Engineers' National Fuels & Lubricants Meeting, The Mayo, Tulsa.

Nov. 5-7. Industrial Management Society's 22nd Annual Time & Motion Study & Management Clinic, Sherman Hotel, Chicago.

Nov. 5-9. National Tool & Die Mfrs. Assoc.'s Annual Convention, Sheraton Hotel, Philadelphia.

Nov. 10-12. Steel Founder's Society of America's 13th Technical & Operating Conference, Carter Hotel, Cleveland.

Nov. 10-14. National Electrical Mfrs. Assoc.'s Annual Meeting, Traymore Hotel, Atlantic City.

Nov. 12-14. Annual Meeting of the Society for Experimental Stress Analysis, Hotel Sheraton-Ten-Eyck, Albany, N. Y.

Nov. 13. Society of Plastics Engineers' Regional Technical Conference, Ambassador Hotel, Los Angeles.

Nov. 17 - 19. Instrumentation Conference & Exhibit, Biltmore Hotel, Atlanta.

Nov. 17-21. 8th National Plastics Exposition of The Society of the Plastics Industry, Inc., International Amphitheatre, Chicago.

Nov. 18-20. American Standards Assoc.'s 9th Annual Standards Conference & 40th Annual Meeting, Roosevelt Hotel, New York.

Nov. 19-20. Illinois Institute of Technology, American Arbitration Assoc., and National Academy of Arbitrators' Arbitration Workshop Conference, Illinois Institute of Technology, Chicago.

Nov. 20-21. National Foundry Assoc.'s Annual Meeting, Drake Hotel, Chicago.

Nov. 20-Dec. 5. American Society of Mechanical Engineers' Annual Meeting, Statler & Sheraton McAlpin Hotels, New York.

Ordinary spring and Strippit Hydra-Spring of equivalent force.

equal stripping power in 1/6 the space

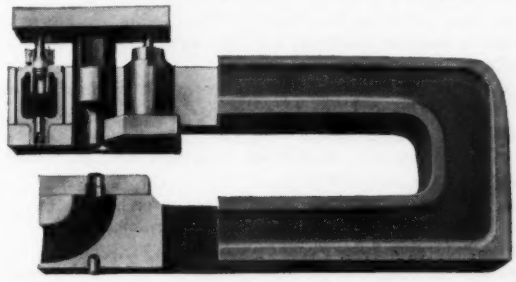
to cut your heavy-duty tooling costs!

Where high stripping pressures are required due to size and type of work or thickness of stock, Strippit Hydra-Springs are the answer. Utilizing the compressibility of liquids, Hydra-Springs develop up to six times the force of equivalent mechanical springs, greatly reducing the number, travel and size of stripping units required.

Impressive economies through Strippit flexible multiple-unit press setups

Like the Strippit, the Hydra-Spring is used in the Strippit line of independent, self-contained, self-stripping punching units. This is the tooling system that breaks the time and cost barriers of fixed perforating dies by permitting simple bench assembly setups . . . all but eliminating press down-time whether it's a long production run, a pilot run for design changes or a "repeat" run later on. No burring necessary, of course.

WHATEVER YOUR PIERCING OR NOTCHING APPLICATION, don't miss the major savings so many industries are enjoying with flexible Strippit tooling. Write today for full details, and if you wish, a demonstration at your plant by a mobile Strippit unit.



Using Hydra-Springs for the heaviest duty work, the Strippit line of hole punching units offers a complete range of capacities up to ¾" in mild steel. A full stock of quick-change standard tools or "specials" made to your order. Warehouse stocks in Chicago and Los Angeles.

WALES STRIPPIT COMPANY

A UNIT OF HOUDAILLE INDUSTRIES, INC.

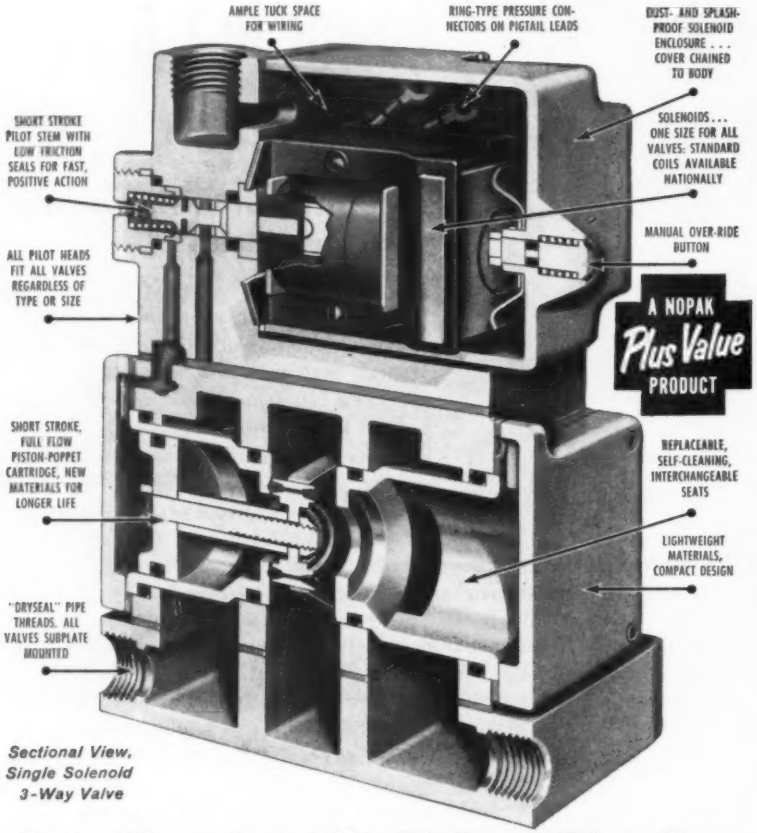
212 Buell Road • Akron, New York

Manufactured in Canada by Strippit Tool and Machine Limited, Brampton, Ontario

CIRCLE INFORM-A-GRAM KEY NO. 45

Nopak-matic Valves set

New Standards of Precision Control . . . in Air Cylinder Operation


AMPLE TUCK SPACE FOR WIRING
RING-TYPE PRESSURE CONNECTORS ON PIGTAIL LEADS
DUST- AND SPLASH-PROOF SOLENOID ENCLOSURE . . . COVER CHAINED TO BODY
SOLENOIDS . . . ONE SIZE FOR ALL VALVES: STANDARD COILS AVAILABLE NATIONALLY
MANUAL OVER-RIDE BUTTON
SHORT STROKE PILOT STEM WITH LOW FRICTION SEALS FOR FAST, POSITIVE ACTION
ALL PILOT HEADS FIT ALL VALVES REGARDLESS OF TYPE OR SIZE
A NOPAK Plus Value PRODUCT
SHORT STROKE, FULL FLOW PISTON-POPPET CARTRIDGE, NEW MATERIALS FOR LONGER LIFE
REPLACEABLE, SELF-CLEANING, INTERCHANGEABLE SEATS
LIGHTWEIGHT MATERIALS, COMPACT DESIGN
"DRYSEAL" PIPE THREADS. ALL VALVES SUBPLATE MOUNTED

Sectional View, Single Solenoid 3-Way Valve

Only Nopak-matic Valves Give You ALL of these PROVEN Plus Values

- *"Flow Director" Pilot Head* — simplifies piping . . . 3-Ways operate Normally Open or Normally Closed; choice of two inlets on 4-Ways eliminates criss-cross piping.
- *3 Pilot Heads Fit all Models* — are completely interchangeable on all valves, regardless of type or size.
- *100% J.I.C. Conformance* — a Complete Line of pilot operated Air Control Valves . . . that meet or exceed all J.I.C. recommendations . . . *at no extra cost!*
- *Fast Maintenance* — complete valve assembly can be replaced *in less than 2 minutes*, without disturbing piping.
- *Replaceable, Self-Cleaning Seats* — fast and inexpensive to replace. Only two size seats fit all valves and are completely interchangeable within the valve or with other valves.
- *Fast Action* — valve shifts in less than 18-thousands of a second.

Available in ¼" thru ¾" pipe sizes for 3-Way and 4-Way operation with air, single or double solenoid pilot.

For the complete Nopak-matic Story, see Catalog 105

Representatives in Principal Cities

NOPAK VALVES and CYLINDERS

Galland-Henning NOPAK Division • 2782 S. 31st Street • Milwaukee 46, Wis.

A8-6391/2R

CIRCLE INFORM-A-GRAM KEY NO. 46

SALVAGING $2,000 WORTH OF ALUMINUM CASTINGS FOR $50

When 40 incorrectly heat treated cylindrical aluminum castings, 9" OD x 16" long, were delivered to the Franklin Machine Products Co., trouble developed as they tried to drill and tap the twelve ¼" dia x ¾" deep holes required on each end. Flanges, as shown in the illustration, were to be bolted on each end of the cylinders. The threads either stripped or chipped off, however, because of the heat treating, making final assembly impossible.

At this stage of processing, the castings represented a $2000 investment in material and labor, and time was short. The problem was solved by using approximately $50 worth of stainless steel wire thread inserts, tap, and inserting tool manufactured by Heli-Coil Corp., a divison of Topp Industries.

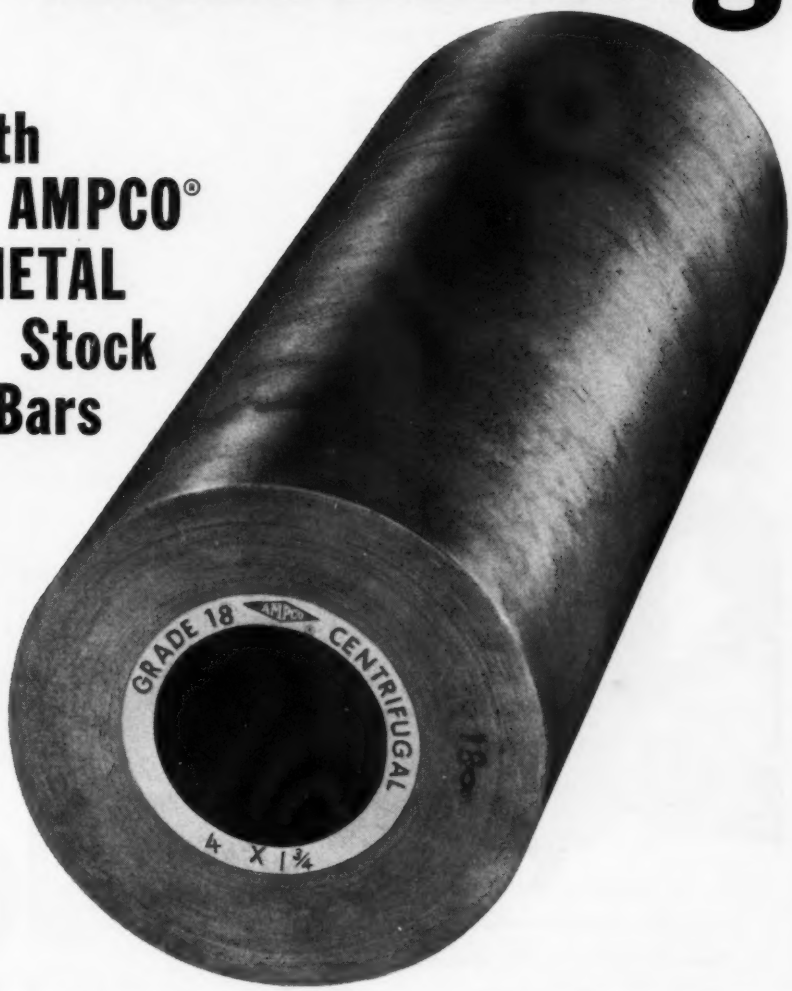
The damaged threads were drilled out and new threads were tapped to accommodate the wire thread inserts. Installation of the inserts was accomplished with an inserting tool, as shown. This brought the thread back to the original ¼-20 size and reclaimed the cylinders with threads 25% stronger than unprotected threads in properly heat treated aluminum.

Some aluminum foil is rolled so thin that 12 sheets of it would not equal the thickness of a human hair, according to General Electric, which has produced a "tension control" system to keep the foil from tearing as it's rolled out to more than 100 times original length.

Save machining

with AMPCO® METAL Stock Bars

Typical bushings and bearings of Ampco Metal centrifugally-cast bars.



Only finish-machine cuts are needed on Ampco Metal Centrifugally Cast Stock Bars. They are semi-finish machined all over — finish allowance, 1/16" on O. D. and I. D.

Made of Ampco Metal Grade 18, a tough copper-base alloy that resists wear, shock, impact. Ideal for bearings, bushings, gears, and similar applications.

Your Ampco distributor has Ampco Metal Stock Bars in stock now — in 90 sizes up to 10" O. D. 12½" lengths. Call him for prompt delivery. *Ampco Metal, Inc., Dept. 54K, Milwaukee 46, Wis. West Coast plant: Burbank, Calif. — Southwest plant: Garland (Dallas County), Texas.*

RM-11

AMPCO

AMPCO®

CIRCLE INFORM-A-GRAM KEY NO. 47

KEEP COSTS DOWN...

with CFC Delpark FILTER-MATIC

It's actually *easier* to reduce downtime and increase tool life with CFC Delpark Filter-Matic . . . for constant vacuum filtration of coolants, cutting oils, rolling oils, solvents and other fluids. Filter-Matic offers a wide selection of elements and filter media to assure the *perfect combination* for your operation.

Use of Leaf-Type *or* Tubular Screen elements is determined by the fluid viscosity, dirt load and proper vacuum required for maximum filtration. Additional control is provided by variety of metal screen or natural fibre filter media. Dual manifold design allows *continuous* filtration.

For the assistance of a Commercial Filters engineer, write to Department TP.

COMMERCIAL FILTERS CORPORATION
MELROSE 76, MASSACHUSETTS
PLANTS IN MELROSE, MASSACHUSETTS AND LEBANON, INDIANA

MICRO-CLARITY AT MINIMUM COST

Fulflo FILTERS — *with genuine Honeycomb Filter Tubes for controlled micro-clarity of industrial fluids.*

CFC FILTERS — *Selective filtration of oils • water-oil separators • magnetic separators • pre-coat filters • coolant clarifiers • automatic tubular conveyors.*

CIRCLE INFORM-A-GRAM KEY NO. 48

NEW MACHINES USED FOR RAPID GROOVING, RUGGED BORING

Two machines—a single-end three-spindle precision borer and a two-way four-spindle groover and counterborer—have been built by Ex-Cell-O for producers of engine components.

The large, powerful boring machine performs boring, plunge facing, and chamfering operations on two types of heavy tractor cylinder heads. Twenty-one surfaces are machined from rough castings in one pass, at depths of cut from ⅛" to 3/16".

After loading, the part is hydraulically clamped and the operator starts the machining cycle. The table moves rapidly to the left, spindles start rotating, and the feed traverse commences. At the end of this stroke, the spindles stop and the table moves out to clear the tooling. Then the fixture indexes, and the operation is repeated on the second set of holes. Fixture and table return to the start position at the end of this feed stroke. Production is 17-18 parts/hr.

The other Ex-Cell-O machine grooves and counterbores 385 universal sleeve yokes/hr. It simultaneously machines both ends of one part as another station is manually loaded. The fixture is designed for quick change-over and accepts a large range of similar parts.

A feature of this four-spindle machine is the method of feeding the special circular form tool. A non-rotating quill containing the cutter spindle is actuated by a hydraulic cylinder to provide the rapid traverse. At the forward end of the stroke, movement is arrested by a stop and the cylinder thrust is directed to within the spindle assembly, where, by cam actuation, the form tool feeds into the work in a uniform spiral path. At the end of cam travel, the cylinder reverses, causing the tool to recede and the quill to move rapidly back to the start position.

Epoxy plastics now can be economically and successfully applied to the manufacture of precision tooling plates up to 20" long. The process is quick and costs only a fraction of precision ground steel surfaces, says Furane Plastics, Inc.

NILSON 4-SLIDE TAKES A TOUGH ONE . . .

Mass production of body trim clips for a leading make automobile proved a complex forming problem. A. H. Nilson's 4-Slide (Model S-4-T) did the job, forming .025" x 3", 1065 C.R.A. steel at 54 strokes per minute! Accurate, fast, and automatic, Nilson 4-Slides keep pace with one of the nation's biggest industries.

THIS ONE WAS EASY . . .

A Nilson 4-Slide, Number 1, forms 150 drapery hooks per minute from 0.70 basic steel wire. Nilson 4-Slides form wire or ribbon stock from the coil. They straighten, feed, pierce, blank, swage, stamp or coin, cut and form in one, fast, automatic operation . . . accommodate wire up to .5" dia., in feeds to 32" max., and ribbon up to 3.5" wide. Press sections from 5 to 75 tons.

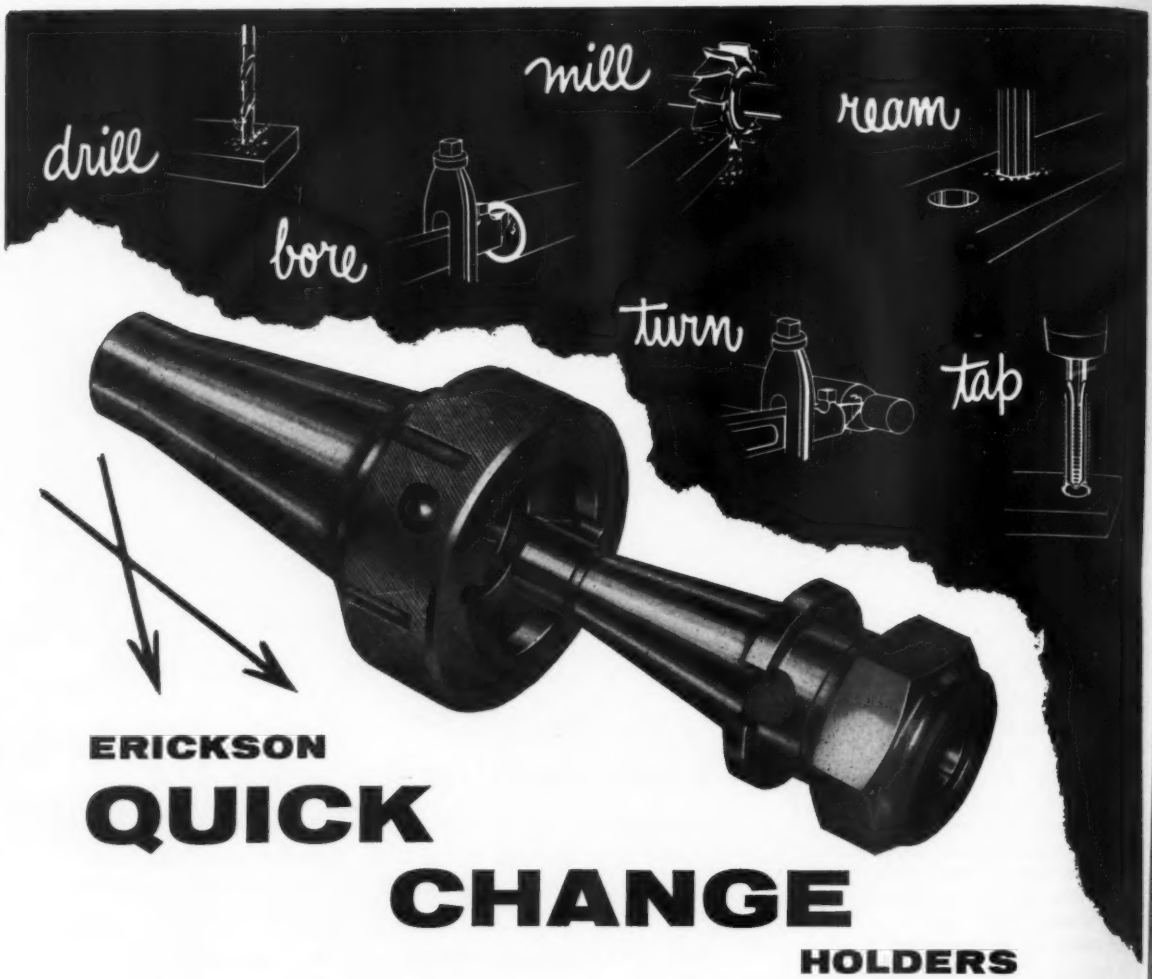
A. H. Nilson provides forming recommendations from detailed information without obligation. Send for catalog.

A.H. NILSON MACHINE COMPANY

1503 BRIDGEPORT AVE., SHELTON, CONNECTICUT

Automatic Chain Making Machines : Staple Forming Machines : Wire and Stock Reels
Wire Straightening Equipment : Slide Feeds for Presses

CIRCLE INFORM-A-GRAM KEY NO. 49



ERICKSON

QUICK CHANGE HOLDERS

...for use with your standard MMS tapered tools
...designed for presetting of tools

Now you can use your present standard MMS tapered tools with the *new* Erickson Quick Change Holders. That means you get the double production advantage of Erickson's *high precision coupled with the rapid change feature.*

Several different models comprise the line: Morse taper holders for boring mills and radial drills, milling machine holders that fit standard spindle tapers, turret lathe holders that increase turret lathe tool-holding capacity, straight shank holders with #30 or #40 MMS socket. These holders take Erickson Collet Chuck milling machine adapters in both regular and heavy duty types, end mill adapters, shell and face mill adapters, Morse taper adapters, boring head adapters, and chuck adapters for Jacobs internal taper.

AA-7455

A call or card will bring the Erickson representative on the double. Meantime write for your copy of Catalog G "Erickson Quick Change Holders."

ERICKSON TOOL COMPANY

34351-11 SOLON ROAD • SOLON, OHIO

COLLET CHUCKS • FLOATING HOLDERS • TAP CHUCKS • TAP HOLDERS • AIR-OPERATED CHUCKS
EXPANDING MANDRELS • EXPANDING-COLLETS • SPECIAL HOLDING FIXTURES

CIRCLE INFORM-A-GRAM KEY NO. 50

PENDING PATENT ARTICLES

"I shot an arrow into the air
It fell to earth, I know not where."

AS YOU WELL REMEMBER from school days, that quote is from Longfellow's poem, "The Arrow And The Song."

A beautiful poem but hardly a practical philosophy for either guided missile development or editorial programming. But we are reminded of those lines when we see how some magazines attempt to be all things to all men. We, TOOLING & PRODUCTION, stubbornly insist on sticking to our knitting.

If we may consider our editorial articles as arrows, rather than "scatter shot," we have to know not only our targets but to what extent we register hits.

For our editorial arrows you readers are our targets, and your answers to the question on our Inform-A-Gram reader service card give us a scoring account of hits, runs, and errors. That question, "Which article in this issue was of most interest to you?" is not only a unique and exclusive TOOLING & PRODUCTION service, but it, along with our being a client of the Eastman Editorial Research Service, represents our continuing effort to gage your interests and to tool our editorial content for the production of ideas most helpful to you.

We are truly appreciative of the time and effort you devote to answering our question, and we are more than glad to pay Uncle Sam his 6 cents for delivering your "vote" to us. For a given month these postage-due's may amount to enough dollars to pay for the authors' articles.

Does it seem strange to you that we consider this a saving rather than an additional expense? Look at it this way: your votes save us from buying any articles of lesser interest to you, because you are continually telling us what you consider of most interest.

So, again, our thanks. To the extent that you send us your votes, you control our editorial subject matter.

This month we are switching signals and offering you still more control; participation in our advance planning.

We want to know if you would welcome a series of stimulating articles devoted to your interest in the U. S. Patent System. We know that you are people who come up with original, creative, and patentable ideas. In the furtherance of your ideas would you like us to tool up for a variety of articles on inventions, patent laws, and patent office procedures, all designed toward showing you how, when, where, and whether, to protect your ideas? These articles would explore such subject areas as:

. . . *from product improvement to granted patent.*
. . . *a scientific principle is not patentable but a device using the principle may be.*
. . . *why was the pencil plus eraser not patentable?*
. . . *patent system growth parallels industrial progress.*
. . . *basic patents can allow full development for public use.*
. . . *early patenting of "non-commercial" inventions in active fields may prove wise.*
. . . *can a patent claim cover a whole group of materials?*
. . . *the time factor in patent grants.*
. . . *benefits derived from patents are not limited to the legal rights granted.*
. . . *the chances are good that engineers will also be inventors.*
. . . *a good team: trial attorney, engineer, and patent attorney.*
. . . *when is an invention sole or joint?*
. . . *patentability of new uses for old materials or devices.*
. . . *the mechanical patent: novelty and utility— the design patent: novelty and beauty.*
. . . *to help a layman understand a precise legal document.*

You T&P readers exercise great control over the conversion of materials into end products through the application of your ingenuity; it is part and parcel of our free enterprise economy. The more you know about patents and patenting, the more you may make or the less you may squander.

If ten thousand of you should read this page (a wild flight of editorial ego) and mail us your vote on this issue's reader service card, we would have to pay Uncle Sam $600.00. We'd consider that a very happy bargain and thanks a lot.

Can you take another bit of poetry — paraphrasing Sir Walter Scott?

Breathes there the man with soul so dead,
Who never to himself hath said,
Why did not I get that patented?

E. Willard Pennington

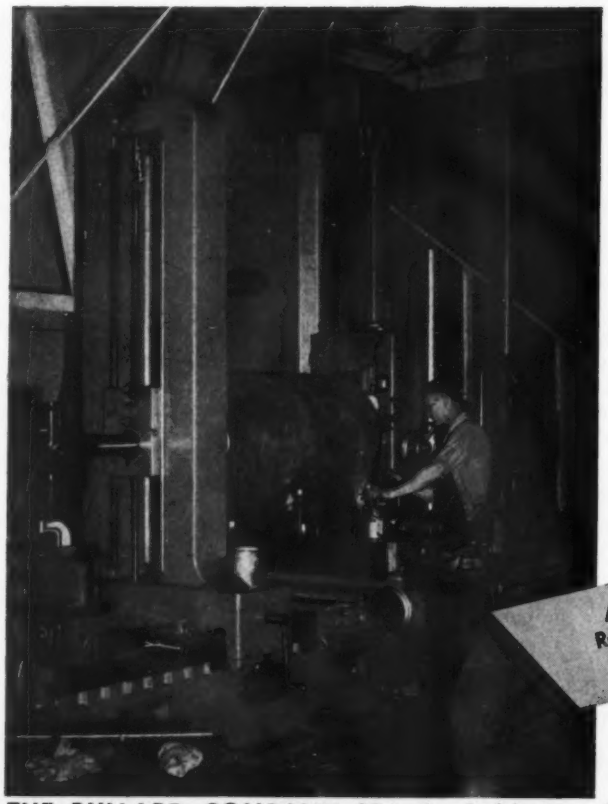
Editor

P.S. Why not turn right now to page 100.1 and do your voting?

"To meet Today's and Tomorrow's Complex Machining Problems

we bought a . . . BULLARD H.B.M. model 75"

This statement by Mr. Reed Clark, General Manager, C. & H. Machine and Engineering Company, Berkeley, California summarizes, after thoroughly investigating and comparing competitive machines, their conclusion.



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SURFACE FINISHES

CARBIDE VS OXIDE

For precision or light machining and long tool life, oxides are usually tops. For uniform finish, turn to carbides, machineability tests show.

by Leonard A. Sowinski
Design and Applications Engineer
Machineability Laboratory
Metallurgical Products Department
GENERAL ELECTRIC COMPANY
Detroit, Michigan

WITH THE GENERALLY INCREASING USE OF CEMENTED OXIDES for cutting tools has come a considerable amount of confusion as to the type of surface finish produced by the oxides. No definite standards of what could be considered a smooth finish — or even a rough finish — seem to be in existence. Since for many applications surface finish is paramount, it was necessary to study the cemented oxides in operation and to compare them with cemented carbides.

Despite much popular belief based on little direct evidence, the finish produced by the oxides is not as good as that produced by the carbides. This statement must be qualified, however, in that several other factors have to be considered before fully evaluating both materials for cutting applications.

Here, briefly, is a list of the types of equipment, tooling, and techniques used during the series of surface finish comparison tests in the machineability laboratory of the Metallurgical Products Department:

Machine: A specially-designed LeBlond 150 hp, 20″ high-speed lathe, variable speed drive giving a maximum spindle speed of 5,000 rpm. With this lathe, tool rigidity is assured.

Material: Normalized AISI 1045 steel billet, Brinell hardness 170-180. (It is fair to assume that trends of the test results would be generally applicable to other materials of similar machineability characteristics.)

Tooling: Disposable inserts of cemented oxide Grade 0-30 and the cemented carbide Grade 330 were held in standard Carboloy (SBPR-85 and SBTR-85) Lift-O-Matic toolholders. The basic difference between these two holders is the effective rake angle. Holder SBPR-85 has a 0° back rake and a 6° positive side rake. Holder SBTR-85 has 5° negative back and side rake angles.

Surface Measurements: Made with a Profilometer, in a direction at right angles to the feed marks. Readings were made in microinches RMS.

Procedures: One of the critical areas definitely known to be important in obtaining better surface finishes is high cutting speed. This is based on the findings of M. C. Shaw and P. A. Smith[1], who report that high speeds minimize built-up edge on both cemented oxides and carbide tools and result in a finer finish to the workpiece. For this reason, the cutting speeds used in these tests were in the upper range of areas considered most practical for the finishing grades of both oxides and carbides.

Other important variables affecting surface finish are the feeds and tool geometry. It is obvious that smaller feeds will improve surface finish by decreasing the height of the feed marks. For these investigations a feed of 0.005 ipr was used, giving a good chip flow and a free cutting action. This feed is fairly typical of precision-finish machining.

In tool geometry, the significant factors are the nose radius and the effective rake. Previous investigations have indicated that at higher speeds, variations in the effective rake angle between a medium negative and a medium positive have little or no effect upon tool life or surface finish.

The effect of nose finish on surface finish is extremely important in the cemented oxide tools. Because of the intrinsic physical qualities of the cemented oxide and its in-

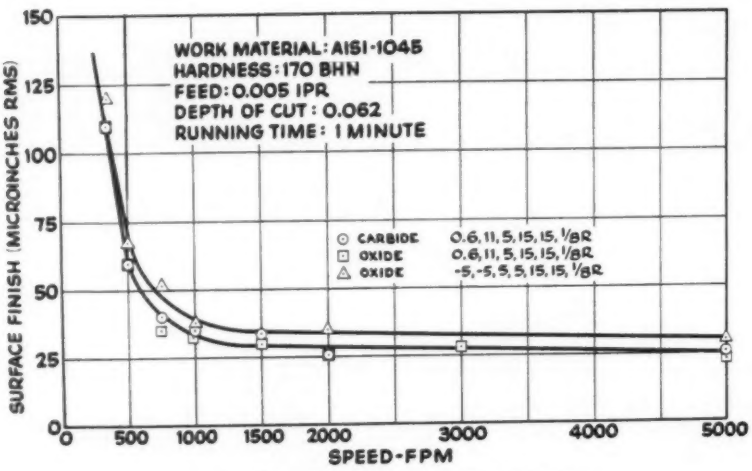


Fig. 1. How Speed Effects Surface Quality

herent weakness, for strength it is advisable to use a larger nose radius than that normally used on carbide tools in light-finishing or precision machining. It is also important to have a 0.002/0.005" chamfer around the cutting edge of the nose radius on the oxide tools. This will minimize any minute chip-out at the beginning of the cut.

Results of the Tests

The first tests were run at speeds ranging through 300-500 fpm for one minute each. These tests were to determine the effect of speed on quality of the surface finish and the different variations.

Figure 1 illustrates this effect, and indicates a significant surface finish improvement as the speed is increased from 300 fpm to 750 fpm. Through 750 fpm to 1,000 fpm there is a gradual, though not so pronounced, improvement. At speeds of 1,000 fpm and above there is a general leveling of the quality.

In this test, tool wear was not considered, and the measurements of the surface finish are the average readings taken from the Profilometer after one minute of turning. The slight difference in surface finish quality between the negative and the positive rake tools is not regarded as significant, and for all practical purposes should be considered alike.

Testing was continued to determine the surface finish quality as the cutting tool reached the end of its useful life (tool life criteria was predetermined at an 0.015" wear land on the cutting edge flank, which is typical of tools used in precision machining). Results of these surface finish measurements are shown in the composite graphs of Figures 2, 3, and 4.

Figure 2 shows a comparison of measurements between carbide and cemented oxide tools. The AISI 1045 billet was machined under identical conditions with both types of tooling. The finish obtained with the oxide tool rapidly increases in roughness, and fluctuates throughout the tool life. Roughness of the carbide tool finish increases at a slower rate and remains fairly steady until near end of the tool life. There the roughness increases rapidly. Throughout the entire range of measurements the finish with the carbide tool was better than that obtained with the cemented oxide tool.

It should be noted that in some applications the tool life is determined solely by sudden deterioration of the surface finish and the tool is immediately pulled from the job. And, certainly, it should be noted that there is a tremendous difference in tool life between the carbide and cemented oxide tools. The oxide tool has almost 300% greater tool life than the carbide under the same conditions.

Figure 3 shows the effect of slight variations in the cutting conditions upon surface finish at 1,000 fpm. These differences were in the effective tool rake and in the nose radii. The test results indicate that these specific changes in tool geometry do not have significant effect on either the tool life or the stability in the surface finish.

Figure 4 shows results of two similar tests run with a cemented oxide tool and a carbide tool. The carbide test was at 1,000 fpm and the oxide test was pushed up to 2,000 fpm. There is a significant difference in the quality of the surface finish. There is more significance in the fact that the change in quality of the carbide tool is uniform, while that of the oxide tool fluctuates over the entire range. It should also be emphasized that used at double the speed of the carbide tools, the oxide tools have longer tool life. But even at the higher speeds the surface finish does not improve with the cemented oxide tools.

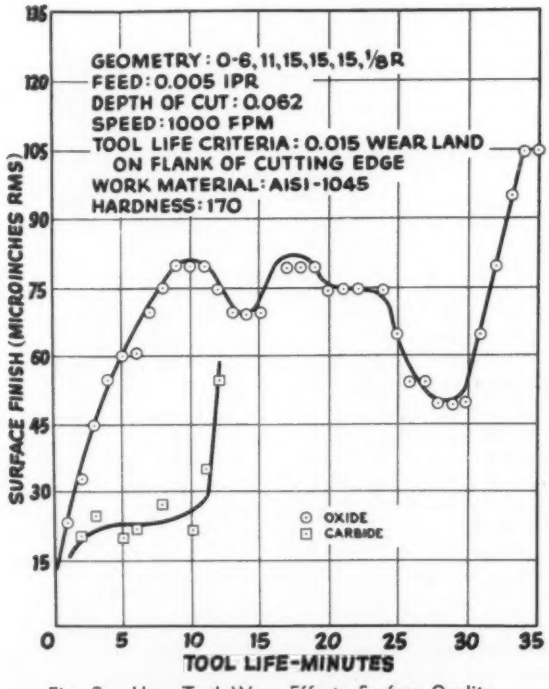


Fig. 2. How Tool Wear Effects Surface Quality

What About Tool Wear?

If these test results are to be fully understood and analyzed, it is necessary to look more deeply into the phenomena of tool wear.

Marchant, Ernst, and Krabacher[2] used a rather ingenious technique to obtain a good chip analysis. They used a radioactive cemented carbide tool in a cut and from the resultant autoradiograph determined that tiny particles of the carbide adhere to the tool chip. The tiny particles are uniformly distributed, causing tool wear by continuous abrasion.

Basically, the tool wear on cemented oxide tools is quite similar to the carbides, where attrition of the cutting edge takes place in cutting operations. Physical composition of the oxides and its characteristics have been mentioned before. One of these characteristics is that oxides are brittle. When wearing away of the cutting edge takes place, the particles of oxide being lost are of larger size than the comparatively small particles of the cemented carbide. On the favorable side of the picture is the fact that the frequency or rate of loss from the oxides is less than the carbides. This is proved by the longer tool life.

Under high magnification of the wear land, roughness of the tool is readily detectable. The oxide tools will normally look rougher and will have visible losses of particle size greater than the carbide tools.

Figure 5 illustrates the greatly magnified profile of a workpiece of AISI 1045 steel traced perpendicular to the cut and recorded on a Proficorder. Cutting conditions were 0.005 ipr feed, 0.032 depth of cut, and 1,000 sfpm speed. Cutting tool signatures were -10, -10, 10, 10, 15, 15, 1/16 radius. The top section of the graph is the profile produced by a cemented oxide tool. The lower section, the profile produced by a cemented carbide tool.

The steady variations in the trace of the carbide tool indicate that the particle loss from the tool cutting edge occurs every revolution, almost infinitesimal that it may be. The particle loss, of course, is uneven, which accounts for the visible regularities of the trace. Particle loss of the cemented oxide tool is much less frequent from one revolution to another than the carbide.

May Look Better With Oxides

This regularity of the trace explains the paradox of why the finish produced by an oxide tool may look better than that produced by a carbide tool, although the smoothness of the two finishes may be identical.[3] In some cases, the oxide finish will look smoother even when the carbide finish is smoother. This phenomena is caused by the regular points of roughness reflecting light to the viewer's eye in a definite pattern.

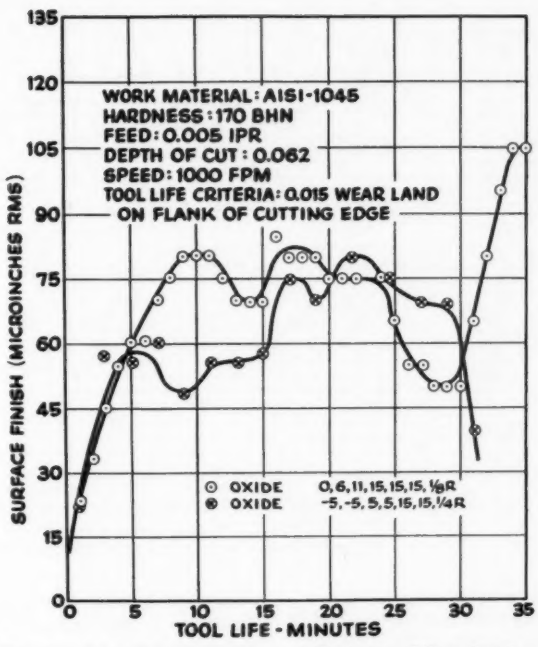


Fig. 3. How Tool Geometry and Tool Life Effect Finish

In the field of machining hardened materials, it is known that surface finishes improve with an increase in hardness.[4] Previous tests, run on AISI 4340 steels, 500-600 Brinell, and AISI 52100 bearing steels, 60-63 Rockwell C, show that cemented oxides can successfully

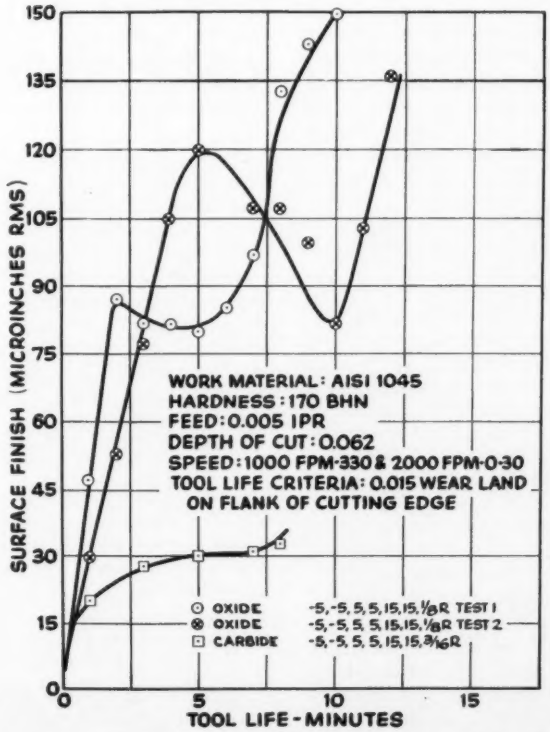


Fig. 4. How Differences in Speeds Effect Finish and Tool Life

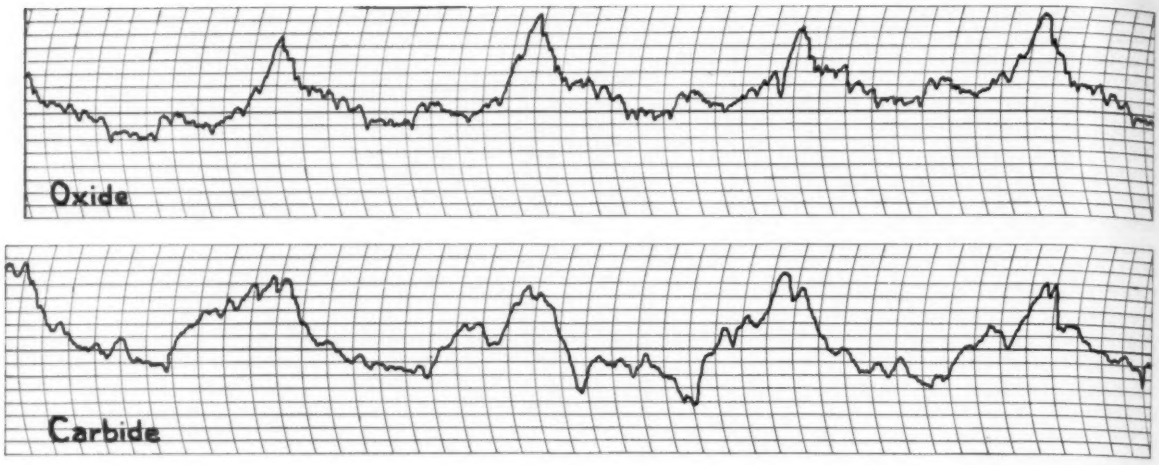


Fig. 5. A Proficorder trace of the finishes produced by a cemented oxide and a carbide shows that regularity of the peaks will reflect light back to the viewer's eye in a regular pattern, which can cause confusion as to the actual quality of the finish.

machine these abnormally hard materials and still obtain surface finishes of 10 to 20 RMS. This better surface finish is very important, because to this must be added the fact that the cemented oxides are already superior to the carbide because of their longer tool life.

There can be no question that the cemented oxides are greatly to be preferred to the carbides if only precision or light machining operations and longest possible tool life enter the picture. When a good and uniform finish is a necessity, however, it is advisable to turn to cemented carbides for best consistency.

end

1 "Tests Compare Finishes from Ceramic and Carbide Tools," by M. C. Shaw and P. A. Smith, **The Tool Engineer**, Apr 1957, pp 97-102.

2 "Radioactive Cutting Tools for Rapid Tool-Life Testing," by M. E. Marchant, Hans Ernst, and E. J. Krabacher, **Trans. ASME**, 1953, Vol. 75, pp 549-559.

3 H. J. Siekmann, **American Machinist**, Mar 12, 1956.

4 "How To Secure Desired Surface Finish in Turning," by Albrecht, **American Machinist**, Oct. 8, 1956.

Inch System of Thread Measuring Studied

The first step towards recognition of the complete unified inch system of screw threads as an international standard was taken at this year's meeting of the International Organization for Standardization, in Harrogate, England.

Reporting on the meeting of the organization's Technical Committee 1 on Screw Threads, chief American delegate R. P. Trowbridge of General Motors, says that the extent to which the unified screw thread standard gains acceptance outside the inch-using countries will depend largely on the degree to which its use is promoted by American, British, and Canadian design practices.

The Unified Screw Thread based on the inch-system was developed by the "ABC Conference on Unification of Engineering Standards," which has been active since World War II. Participating members are the national standards bodies of the U. S. and Great Britain. At the same time, the International Organization for Standardization has been working on international standards for screw threads based on the metric system. Twenty-six countries are participating in the project.

The outcome of this year's meeting of the Technical Committee 1 was a resolution to accept, parallel with metric standards, a draft proposal that covers inch-system screw thread of sizes below ¼". A draft proposal is a proposed standard to be circulated among committee member countries for approval. A draft proposal for size ¼" through 6" to be used parallel with international metric standards had been accepted by the Committee in 1957.

The ultimate object is that International Organization recommended screw thread standards should include both metric and inch screw thread for applications to bolts, nuts, and screws, as well as a listing of preferred threads in both systems.

"Acceptance of the unified inch screw threads and American screw thread technology will depend on the extent to which the U. S. cooperates with the working groups of the Technical Committee 1," believes Trowbridge. "Other countries recognize the great amount of work and experience which American Standards B1.1 and B1.2 represent." (B1.1 covers unified and American screw threads for screws, bolts, nuts, and other threaded parts, and B1.2, screw thread gages and gaging.)

"These countries want to learn from the U.S. as much as possible of the Unified Screw Thread Standards. They also would like to share data and experience on screw thread experimental development, manufacturing, and application. A continued show of interest on the part of the U.S. through active participation, preparation of drafts, translations, and conversions of inch tables into metric units, as well as the official recognition of the International Organization's status of the unified thread, will assure ever wider acceptance of the unified threads, and thus, of American products in international trade," said Trowbridge after the meeting.

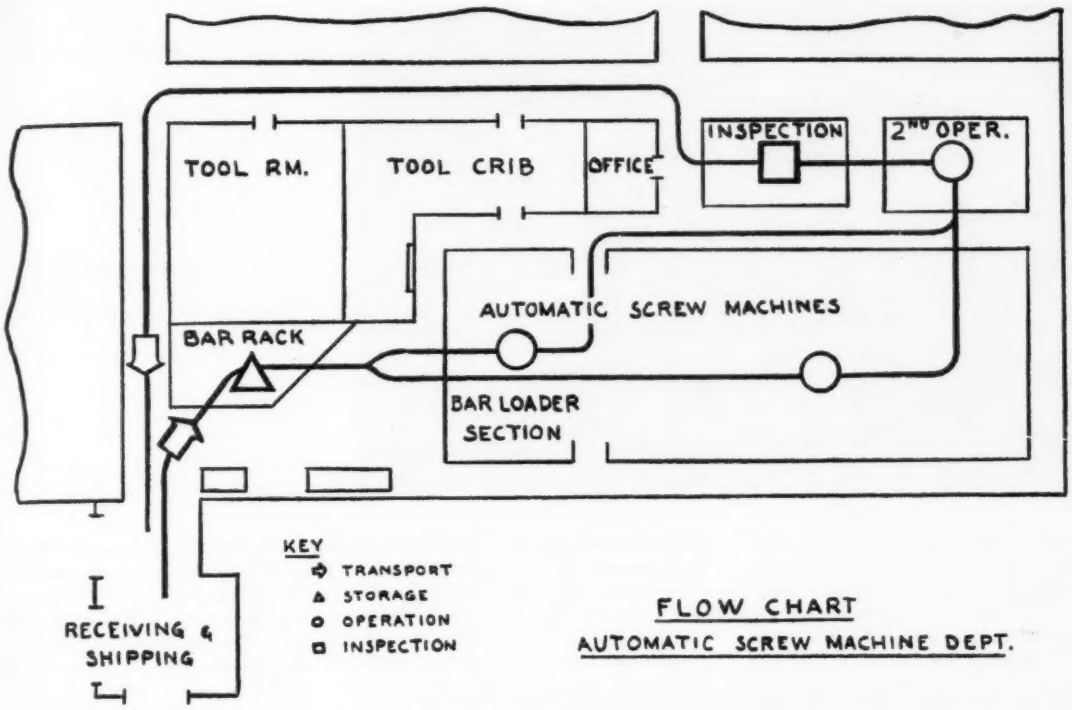


Fig. 1. A flow chart of Dictaphone Corporation's new automatic screw machine department.

Good Layout and Equipment Make

AN EFFICIENT SCREW MACHINE DEPARTMENT

NEW BUILDING SPACE HAS BEEN ACQUIRED, and management says the screw machine department can be set up in the new area according to *your* specifications. How would you do it? These were the circumstances presented to Plant Engineer - Manufacturing Layout at Dictaphone Corporation's Bridgeport (Conn.) plant last year.

Given this unusual opportunity in shop layout, a great deal of time was spent on the physical plan of the screw machine shop to obtain maximum production and also recover a good share of the "moving cost."

The newly acquired structure provided for a shipping and receiving dock in the east end of the building (Fig. 1). Following the flow of

Fig. 2. Ready access to Lipe AML bar feeds from unique Flexangle bar racks makes it possible to move raw material through the machine shop faster.

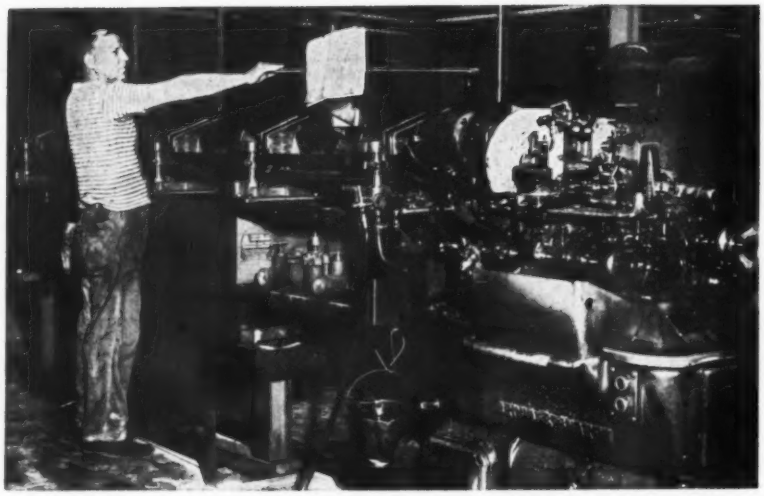


Fig. 3. An operator loads an AML bar feed. Its magazine rack holds enough bar stock for a complete production run.

materials, next a unique bar rack storage area was devised by the Dictaphone Plant Layout Engineer. The rack was built from Flexangle and constructed to receive bar stock in its normal direction of travel. Material in its compartments can be identified easily both visually and by numbered and lettered tags.

Figure 2 shows the convenient access from the bar rack to the screw machines. Since this section, which includes Lipe bar feeds attached to B & S automatic screw machines, is the heaviest consumer of bar stock it was natural to place it adjacent to the storage racks.

The Lipe automatic magazine loading bar feeds are important factors in smooth work flow in the screw machine department. They are air-operated, and magazine capacity is from nineteen pieces of 5/8" to ninety-six pieces of 1/8" dia stock. Bar stock or tubing is racked in the magazine along one side of a split stock tube, the lower half of which slides backward to receive the bottom bar from the magazine. Carrying the bar, the lower half of the tube returns to a closed position. A pneumatically-operated stock pusher moves the bar into the spindle and collet of the screw machine and then automatically re-engages the machine clutch. Once loaded, the bar feed action is completely automatic, feeding stock continuously.

Dictaphone credits the AML feeds for increasing production, particularly in the machining of short cycle parts such as feed screws and mandrel bars. The use of bar loaders has reduced the need for machine tending, the company reports, and freed operators for machine adjustment and tool grinding jobs.

The balance of the screw machines are placed by machine class immediately behind the Lipe bar feed section. Following the flow chart (Fig. 1), work moves from automatic screw machines to a second operation section. Adjacent to this second operation, workpieces are given a final inspection and quality check. Work then progresses to the near-by main plant for subsequent assembly into dictating and recording machines.

Several other features of the Dictaphone shop plan are noteworthy: The foreman's office is conveniently located in a central position for effective supervision of his department; the tool crib is situated to provide ready access to cams and tools for screw machines; and the toolroom is adjacent to the tool crib, facilitating re-grind and repair. A supply of uniformly distributed light at approximately 60 foot-candles floods the area for adequate illumination throughout.

Results of Dictaphone's planning are more efficient production and improved product quality, both so essential in the manufacture of precision dictating and recording equipment. end

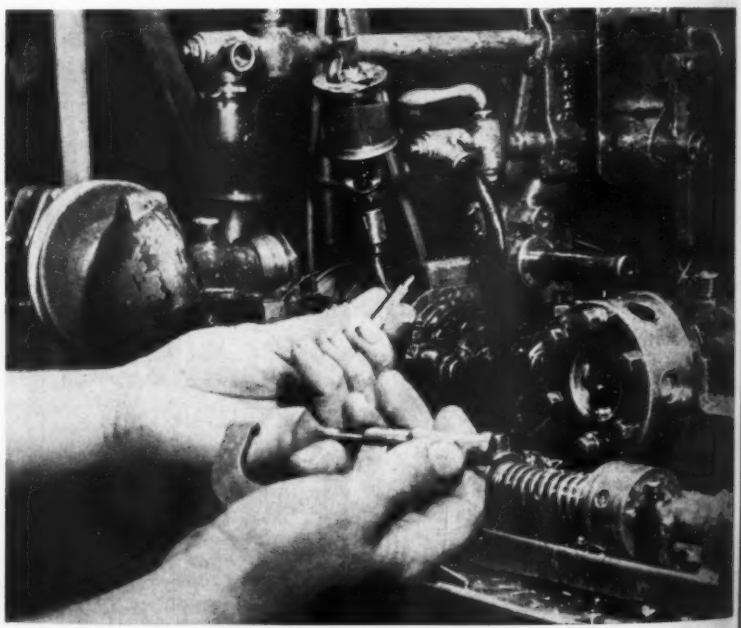


Fig. 4. This part is produced on a B & S screw machine for dictating and transcribing machines. Cycle time is 6 sec, and use of Lipe AML bar feed permits full hour's production of 600 pcs without lost time for reloading machine.

MECHANIZED ASSEMBLY OF TRANSISTORS

by Richard C. Shafer
Development Engineer
WESTERN ELECTRIC COMPANY, INC.
Allentown Works

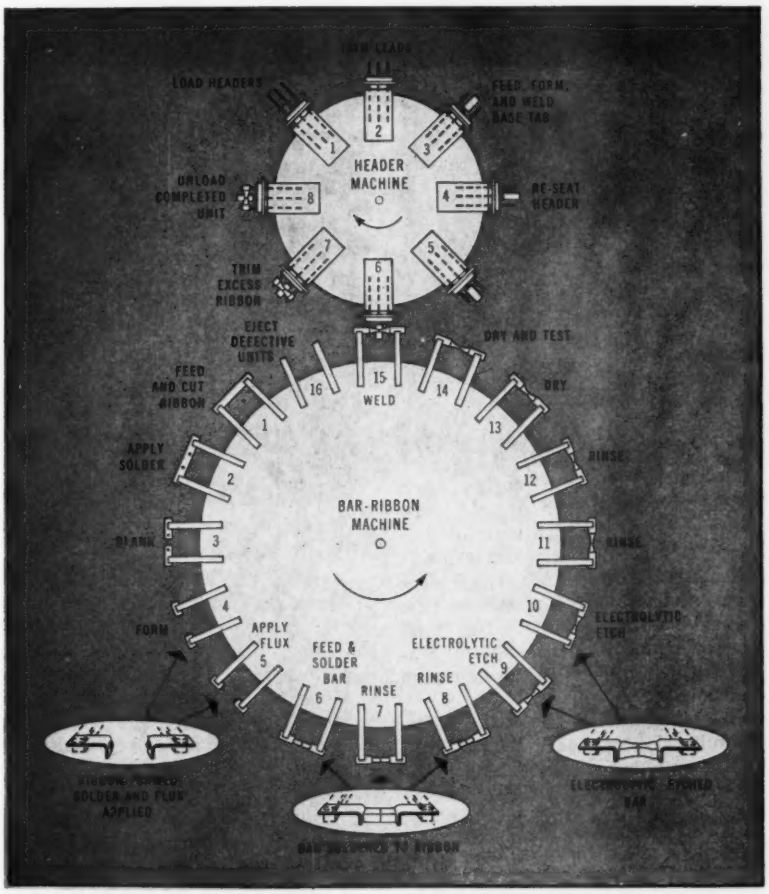
Although manufactured in considerable volume since the announcement of its invention ten years ago at Bell Laboratories, the transistor, because of the minuteness of its components, its rigid spacing requirements, its rapidly changing code specifications, has been produced by assembly methods that are essentially manual. Now, however, transistors are being assembled automatically by a machine at Allentown.

THE COMPONENTS OF A TRANSISTOR are extremely small and operations of assembly are critical and must be precisely controlled. Although they are being manufactured today in considerable volume, the assembly of transistors has remained essentially a manual operation by highly skilled workers using microscopes, oscilloscopes, micromanipulators, and other production equipment of similar precision and expense.

From the very beginning of Western Electric's program of transistor manufacture it was realized that the transistor's great potential would never be fulfilled unless they could be successfully produced in large volume and at low cost, in a degree attainable only by the mechanization of manufacture. An engineering group was organized in 1951 with the exclusive function of investigating the mechanization of transistor assembly processes.

One mechanization project concentrated on the assembly process in the manufacture of the grown junction transistor, a type characterized by an extremely thin layer of P-type germanium grown between two N-type regions. A new transistor design was developed in order to promote efficient mechanization, and a machine for performing some of the assembly operations was planned.

The most significant product change made to permit mechanization of assembly was the use of 0.005" thick Kovar ribbons which are cut, formed, and then soldered



The development of methods of mechanized manufacture is a significant part of the maturing of transistor technology, since low costs are essential to wide application of transistors. The transistor assembly machine marks a first step in the monumental engineering effort whose final goal is a completely mechanized line.

to the germanium bar to support the bar during etching and associated processing.

Treatment of the bar with etchant is necessary because previous processes, such as sawing of the germanium bars and soldering, cause surface disturbance of the atomic lattice structure and objectionable surface contamination. The etching process removes the damaged surface layer of the bar. After the etching operation the bar is rinsed, dried, tested, and welded to the header. Processing and evaluation of the bar-ribbon sub-assembly before joining it to the header is an economical safeguard, since in this way good headers are not associated with defective sub-assemblies. The sub-assembly itself may be safely, rapidly etched as an individual unit, avoiding contamination of the header with its delicate glass-to-metal seals. The ribbon is trimmed then and the assembly is ready for enclosure.

Design of the Machine

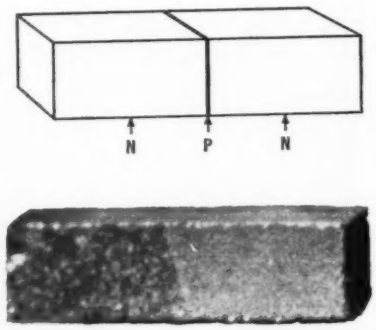
A rotary indexing table offered maximum accuracy of index combined with the necessary indexing speed. Two such tables were needed since the assembly operations have two parallel paths: processing of headers; assembly of the bar-ribbon assembly. One sixteen- and one eight-position index table were purchased, each with individual motors and index controls. They were mounted on a single base with one work station common to both units, at which station, product from both units could be joined. Brackets for supporting the stations around the periphery of the indexing ring were also provided.

Since the index tables for moving the assemblies between work stations were purchased, the major share of the machine design work concerned the drives of the work stations and modifications of the experimental tooling to integrate it with the index machines. There were many different types of tooling that might perform the work station functions acceptably but the special features of the process influenced each decision.

Machine motions were expected to be quite slow but accurate.

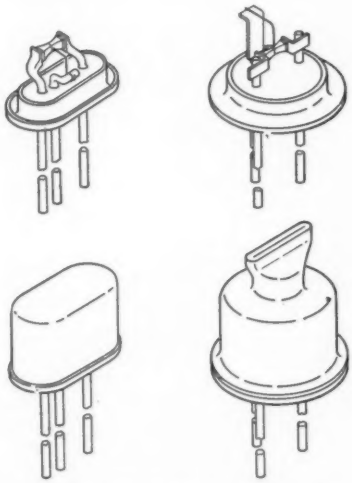
The working stations had to be compact since they were to be located on the mounting brackets arranged around the periphery of the rotary table.

The final choice of type of working station mechanism was dictated partially by these considerations and partially by the satisfactory past experience of the engineers with cam-actuated mechanisms which were used.



The NPN grown junction bar, shown beneath a schematic drawing, is 1/8″ long. The layer of P-type germanium is about 0.001″ thick. The small size and brittleness make it difficult to feed the bars automatically.

Since interrelation of motions had to be controlled only within stations, each station could be timed independently. Thus, timing for all related motions was confined to each station where it could be controlled from one point, a cam shaft. Most of the cams are of the disc type whose simple design favors easy fabrication and modification. Although such cams are not of the positive motion type, most of the mechanisms they controlled were designed to fail safe in the event of failure of the spring powered return, thus minimizing the danger of machine damage. Ultimate protection was to be provided by an electro-mechanical interlock system.



Modification of the grown junction transistor from the original design, at the left, to the present design. Not all the changes were made to aid mechanization, but the introduction of formed ribbons significantly simplified manufacture.

Flexibility of adjustment was provided by using set screws to secure the cams in position until it was certain that they were correctly timed. Then dowel pins inserted through both cam hub and shaft permanently fixed the timing. Similar flexibility in the location of parts, stations, and even the index tables was achieved by dowelling after the correct location had been established.

Interstation timing had only two requirements: that they start and complete the work cycle together. A horizontal encircling roller chain drives all stations of each index machine through sprockets which in turn drive the station cam shafts. Actually, all stations were timed to the single revolution clutch which controls the chain drive. The method of achieving temporary adjustment by set screws and permanent location by dowelling was applied to the sprockets.

Machine Control

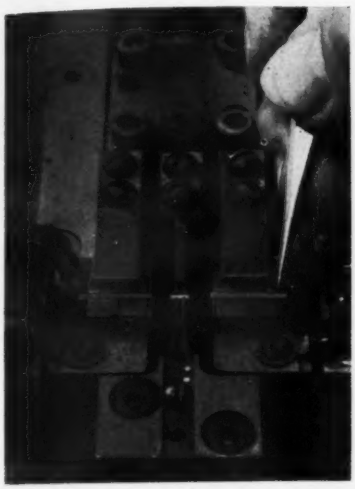
The control system has two main jobs: control of the cyclical operation of the four drives (two index tables and two station drive systems); monitoring of machine operation to detect errors that might cause damage.

It was planned to control the timed cyclical operation of the machine, and alternate table indexing and work station cycling, from adjustable cam timers which would be in turn controlled by a master timer. Thus, the activation of index table and station drive clutches would start the respective cycles.

The detection of machine failures is the function of the interlock system. Limit switches were mounted in position to sense the location of the mechanical details, in order to detect the improper position of parts when this condition might create a machine interference either during the index or the working cycle. Upon such failure the interlock system was designed to stop the machine operation and prevent starting until clearance of the trouble. A signal system was provided to assist in locating the trouble.

There were several special jobs assigned to the control system. To save expensive headers the control system was designed to test bar-ribbon assemblies and prevent index and station operation of the header machine unless a good bar-ribbon assembly would be ready for the welding to the header. Similarly, the correct location of ribbons was to be tested just before soldering to save bars of germanium in the event that ribbons were missing or im-

THE PRINCIPAL MANUAL OPERATIONS WHICH CAN BE PERFORMED BY THE ASSEMBLY MACHINE



Loading the soldering jig whose heaters move the ribbons against the bar ends.

Electrolytic etch with a bar covered by etchant which flows down the electrodes.

Rinsing the etchant from a bar-ribbon assembly with ultra-pure deionized water.

The leads of transistor headers are trimmed to length by an air-actuated tool.

Forming the base lead, as on the header being removed, is done by an air tool.

Placing a bar-ribbon assembly on top of the header leads in the welding jig.

properly located. Also, cam timer control was designed for a few work station operations which were designed for air cylinder operation.

Prove-In

Although there were many changes made to the machine during construction and prove-in, three were of major significance: the mechanism for applying flux had to be redesigned; the solder coating on the ribbons was found to cause welding difficulty; the control system was modified to provide greater flexibility for manual operations and to extend the protection of the interlock system.

The station for applying the liquid solder flux to the ribbon surfaces to facilitate soldering to the bar was considered a routine matter and no experimental model had been built. Thus, at the start of the prove-in period the flux station mechanism was untried. However, it was simple in design, consisting essentially of a rotary moving brush which picked up flux from its travel through a container and then brushed past the ribbon surfaces to which the bar would be soldered. During prove-in it became apparent that partly because of surface tension and partly because of the brushing action an inadequate amount of the flux was adhering to the ribbon. By dabbing with a hand brush a uniform drop of ample size could be consistently transferred to the ribbon.

Two changes were needed to resolve the difficulty. The brush on the end of the rotating arm was replaced by a solenoid powered mechanism that duplicated the hand dabbing of the brush. To provide a surface that would hold the liquid flux better, a modification was made to tooling of a preceding station to produce a scored surface on the ribbon.

The engineers developed a process for melting solder directly on the narrow ribbon. The required thick-

Several of the design changes resulting from the mechanization project were used on the regular line.

ness of about 0.002" was met by a machine that continuously fed solder ribbon to the continuously moving, heated and fluxed ribbon. Thickness could be varied by changing the relationship of the two speeds. The resulting coating was adherent and flat enough to be used on the assembly machine.

One of the last operations to be proved-in was the welding of the bar-ribbon assembly to the header, since parts for its operation had to be made on the preceding stations of the machine. At that time it was found that the low melting point of the solder contributed to weld splashes. The drops of molten solder which often lodged on the unit, usually on the header, were considered to be a potential source of failure because of the chance that after enclosure the drops might become loose and move into a position where the transistor might be shorted. Therefore, another means of providing solder on the ribbon had to be devised.

Thus, during the later stages of prove-in, a new work station was developed to apply solder to the ribbons in two spots (only where needed for soldering the bar) leaving the remainder of the ribbon free of solder.

Several modifications were made to the control system. Originally, the controls were planned for automatic operation and the machine was adequately protected by the interlock system during such operation. However, assembly and prove-in work required an unusual degree of versatility of manual operation. Not only was such operation an inconvenience with the original controls, but it was also unsafe, since manual jogging operations could result in machine situations which were out of normal timing and thus constituted a possibility of interference. Because such operation had not been expected the interlock system did not provide protection.

One point of trouble was the cam timer controlled work station operations which on manual control were sometimes found to get out of synchronism with the rest of the station operations. Damage could result. Therefore, the timing of these functions was transferred to the station drive system so that it would be unlikely for an out-of-synchronism condition to develop on the stations.

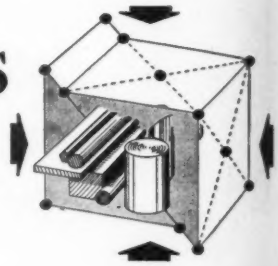
Now that the modifications have been successfully completed, the transistor assembly machine is entering regular shop production service. Transistors for Bell System use were produced on it during the recently finished prove-in. What lies ahead is the education of shop personnel in the operation and maintenance of the machine and the testing of the machine's ability to produce efficiently under a full production schedule.

Transistor technology is still a very new art and frequent improvements in design and performance can be expected as the result of the broad and intensive development effort that is underway. The machine described is the forerunner of a new generation of assembly mechanisms which will be required to support advances in transistor technology.

end

Mr. Shafer's article originally appeared at much greater length in the July 1958 issue of "The Western Electric Engineer." Our presentation is a condensation by Charles Weiner, Assistant Editor, TOOLING & PRODUCTION. We are grateful to Western Electric for permission to repackage such important transistor production know-how.
E. W. P.

LICKING THE TOUGH ONES BY COLD EXTRUSION



In Review: Cold extrusion is the forcing of a metal (our concern) while cold, through an annulus — an opening created between a punch and die. The pressure and speed of the punch are critical, depending on the metal involved. Impact is often used but many "strong alloys extrude best without it."
A part becomes a candidate for cold extrusion when: 1) it is hollow with one end closed; 2) (especially so) it is longer than 2 or 3 times the diameter; 3) there are internal or external ribs; 4) the part is round, rectangular or polygonal; 5) it contains special cavities in or out of the closed end; 6) walls of zero draft are required; 7) pressure tight cams are required; and 8) strength and toughness are required which cannot be achieved from a mill-stock-machineout.

EXTENDED APPLICATION OF COLD EXTRUSION TECHNIQUES to metals having corrosion resistance and resistance to high temperatures, has been accomplished by the Hunter Douglas Aluminum Division of the Bridgeport Brass Company.

Metals having the above characteristics that have been successfully extruded include zirconium in the reactor and metallurgical grades, pure molybdenum, 446 stainless, and 4130 steel. Successful cold extrusion of these metals, now in production, are first known instances.

The cold extrusion of reactive metals, such as zirconium and molybdenum, is especially beneficial since it is done at temperatures below those at which reaction with

the atmosphere takes place. This eliminates much of the special handling required in hot work. In addition, the close dimensional control and superior finish produced by cold extrusion eliminates many secondary finishing operations.

Also, the reduction of scrap, offered by cold methods, is a distinct economic advantage over fabrication by hot extrusion; here again, this is in part due to the absence of secondary operations. Scrap reduction becomes even more desirable when considering that production lots are still very low for parts using these metals.

We are told that the techniques used for this cold forming are unique — also proprietary — thus a conspicuous lack of technical information has been divulged; as yet techniques are classified due to their AEC and missile application.

Fig. 1. Pure cold extruded molybdenum tubes are shown here. The as-extruded surface finish is 140 rms and the wall thickness of the long thin tube is 0.022″ to 0.0235″. No secondary operations have been used (except chemical cleaning).

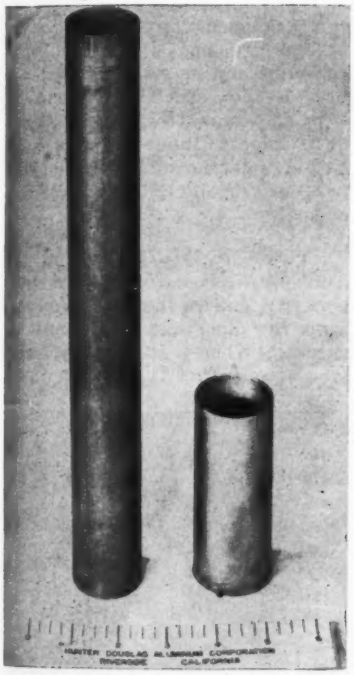


Fig. 2. This interesting tube shape was cold extruded, with integral strengthening ribs, at a wall thickness of 5/16″ It was made from SAE 4130 steel.

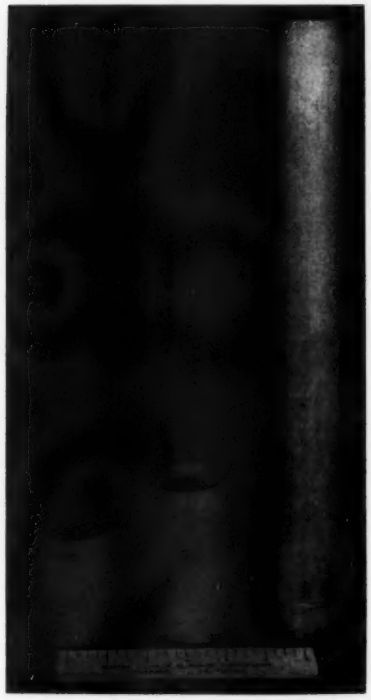


Fig. 3. Shown here are the slug, cup and the cold extrusion made from 446 stainless steel.

However, cold forming procedures have been developing rapidly and their use is fast becoming commonplace for metals less stubborn than those mentioned above. If your products appear to be candidates for cold forming, we will be pleased to help you with the names of companies doing this work and an information "search out".

—write William E. Hoffman
Associate Editor

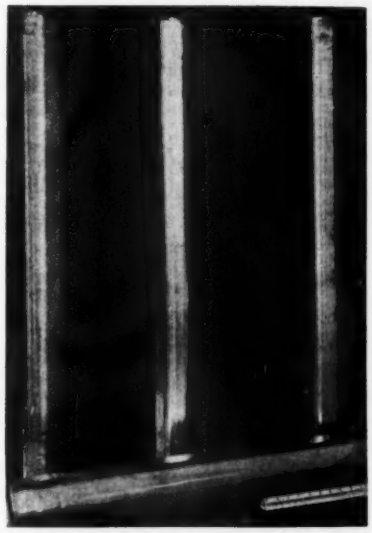


Fig. 4. The writer feels that these lengths for cold extrusion are something". The metal is a metallurgical grade zirconium and the parts are 4 ft long having hexagonal exterior surfaces and a round hole. Since metal doesn't readily flow sideways, during extrusion, we wonder if the slug here and in Fig. 2 were other than round to start with.

Coming Soon:
TOOLING & PRODUCTION REPORTS ON...
BERYLLIUM
TOOL CRIB CONTROL
PROFILE ROLLING
INVENTORY REDUCTION

"EGG CRATE" SAMPLING: UPS PRODUCTION & DOWNS COSTS

A way to spot *and stop* defects before they go through the whole manufacturing cycle, as proposed by Parker Aircraft's Q-C director, William R. Baker, at the recent ASTE convention in Los Angeles.

TOO OFTEN INSPECTION SYSTEMS which are excellent in preventing the final delivery of unsatisfactory parts to the customer are slow in pinpointing the exact source of the error and reporting it to the responsible group. Further, tool engineering is specifically concerned with those phases of quality control that deal with the early discovery and prompt reporting of defects directly chargeable to faulty tooling.

In short runs, this delay will allow a critical mass of rejectionable parts to go through the entire manufacturing operation before corrective action is even started. This can mean the difference between a profit and a loss on a short run.

In longer runs, even with their wider time latitudes, early detection and localization of an error source is still an essential of economical manufacturing.

In the "egg-crate" inspection system, the machine operator runs a continuous check on his own work. Extra time is allocated to him for this purpose, but the results are worth the extra effort. In one case, Parker switched to the egg-crate systems and immediately dropped its customer rejection rate on a complex hydraulic control mechanism from 10.0% to 0.70% (a reduction of over 90%) which many times over repaid the cost of the time given to the operator for his inspection duties.

The outstanding feature of this system is its complete simplicity. In order to put the system into effect, no purchasing of expensive equipment or extensive reorganization of existing facilities is required. Inspection and quality control do not even have to take new data. All that is required is that each machine operator inspect his work, which he partially does anyway, in a systematic procedure, and that he record his findings in a methodical manner (which he does not do now.)

The egg-crate system will not only increase the quality of the end product, but it will greatly assist the tool engineer. Accurate data is obtained on tool wear factors and machine capability. Errors in planning and tooling can be spotted immediately, and the source of trouble is pinpointed without having to examine the entire production line.

The egg-crate system gets its name from the rack that is used to contain all parts during machining operations, and which closely resembles an egg-crate. Parts ready for machining are delivered to the machinist in the crate. After each part is machined, it is returned to its own egg cell. Each part remains in its cell throughout the entire manufacturing process. See Figure 1.

Progressive sampling by the operators, and the manner in which the sampling is done, are unique features of the system.

In the case of one particular type of hydraulic valve, rough castings arrive at Parker, and are first inspected for defects as required by military specifications. Prints and routing orders are checked for possible revisions to insure that the bodies will be machined according to the latest specifications.

Each part is put in its cell in an egg-crate, and stamped with a number. If there are, for example, 100 castings in a group, the first casting placed in the rack is stamped number one, and the rest in numerical order. These numbers are also put on the purchase order for future reference. The latest engineering, routing, and process drawings are attached to each rack. Then the rack is released to production.

Machining of each body is done in numerical order. The machinist starts with part one and works in sequence through the number of parts in the rack.

Gaging List

A gaging list is included in the process drawings attached to each egg-crate and its main purpose is to provide the Inspection Department with an accurate progress and condition report. It shows the machinist the dimensions that must be held in order to maintain a high standard of quality.

Figures in the top row of the gaging list (Fig. 2) are part numbers. All entries in the left column show the dimension which must be checked. When a valve body meets

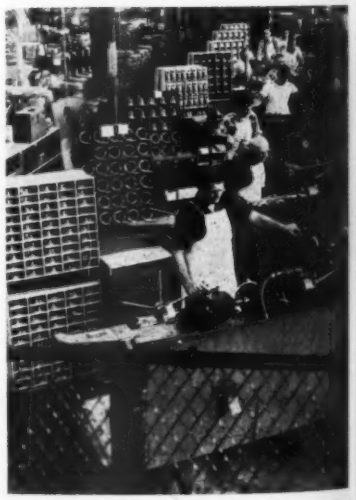


Fig. 1. Extensive use of egg-crate system is shown in this view of facilities at Parker Aircraft Co., Los Angeles. Egg-crates are easily modified to hold parts of different sizes and shapes.

all requirements, the operator's stamp is entered in the proper square. If the part does not meet the requirements, then a check must be put in the square. When finding a part that does not meet specification, the machinist checks all parts since the last inspection.

For example, suppose that the body numbered 15 passed, but the body numbered 20 did not pass inspection. Then the four preceding parts (19 through 16) are checked to see if they pass inspection. In this way the machinist can readily determine if he has made an error on one part, or if his tooling needs adjustment or replacing. Instead of having to check through a whole group of parts, only four must be checked. Furthermore, if something has happened to the tooling, a very small number of parts have been worked before the trouble is found.

When a part fails to pass inspection, it is reworked as soon as possible. If scrap, the part is painted red and replaced in the rack. (Spray can is in possession of inspector). Then the actual condition of the part and the part number, are recorded on the back of the gaging list.

Leaving rejected parts in the egg-crate serves several functions. First, it gives the machinist an indication of the quality of his work. Naturally, a good man does not want his rack filled with rejected parts.

Second, it permits the foreman to isolate the cause of a high rejection rate. He can immediately determine which operator and which machine are responsible. This allows adjustments to be made, if necessary.

Third, it allows the production planner to estimate how many acceptable parts he will have at the end of machining.

Fourth, it simplifies the work of quality control in determining the reject percentage.

Fifth, assignable causes are quickly determined by an action committee, composed of quality control, production, process engineering and, if necessary, design engineering.

Inspection Brings Quick Action

Regardless of the number of pieces to be produced, the best inspectors are placed on the line to check out the first 25 parts. These first 25 parts prove the machine capability and the tooling.

If any errors are found, the tool engineer is called in immediately, and shown the exact nature of the trouble as well as the location of the source in the production line. During production of these parts all variable dimensions are tabulated so that the tolerance ranges can then be determined. All this information is given to the tool engineer for study. If any corrective action is required it is taken immediately.

During machining, inspectors check parts along the line. Parts other than those checked by the machinist are spot checked. The inspector is also responsible for seeing that the proper gaging lists are at each operation. Furthermore, he is responsible for maintaining detailed corrective action reports on the backs of the gaging lists, including tool changes, fixture correction, and operator instruction.

In order to provide a maximum amount of useful data on tool wear factors and machine capabilities, variable checking equipment is used quite extensively. When a part is out of tolerance, the amount of variance is recorded on the gaging list. Therefore, when the tool engineer checks through the records he can tell when a tool should be changed.

When machining operations are completed, a review of the gaging lists and rejects is made. Scrap parts are removed from the egg-crate, and visual inspection is performed on the remaining parts to see if any damage has occurred during handling. If no damage has occurred, the parts are released.

By using the egg-crate system, in-

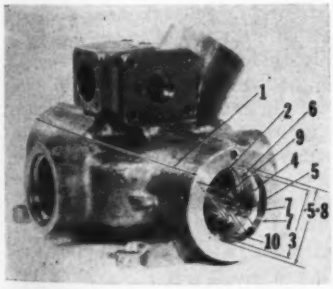
OPERATION NO. 40

EVERY 5TH PIECE TO BE CHECKED — BODY NUMBERS

GAUGING LIST	1340	1345	1350	1355	1360	1365	1370	1375
1 5.938 ± .001 DIM.	✓							
2 .75 ± .005 DIM.								
3 1.150 ± .005 DIA.								
4 .578 ± .005 DIM.								
5 1.188 ± .001 DIA. X .208 + .005 − .000								
6 TRUNCATION 1.0649-1.0724 DIA.								
7 .005 MAX. RAD. 1/32 RAD.								
8 32 FINISH								
9 .703 ± .005 DIM.								
10 1 1/8-18 NEF-3B THD.								

IRREGULARITIES

BODY NUMBER	
1340	5.938 ± .001 is −.001 - Rej. tag #14002 — use as is.



DETAILED CORRECTIVE ACTION REPORT

Previous pc. checked — found OK — Indicator checked OK — Storehead signed.

Fig. 2. Gaging list gives complete information on all inspection measurements and checks to be made. Machinest certified that part has met requirements by placing stamp in proper square. Check mark indicates that part has failed to meet requirements. When part is found that fails inspection, machinist checks all parts worked on since last inspection. When cause of error is found, this information is entered on gaging list. Nature of corrective action and disposition of part is also recorded on gaging list.

spection along the line replaces the final inspection. Therefore, fewer inspectors are required and the inspection department becomes a true quality control department.

Quality control maintains a master book on every run that is being made in the plant. The master book includes a gaging list, a guide for the machinist's use of the gaging list, duties of the line inspector, and instructions for control of rework by the machinist and the foreman. The master book contains all information necessary for successful operation of the egg-crate system.

Effect on the Machinist

It may be argued that if the operator checks his work on the line he cannot produce as many pieces. However, Parker's experience shows that since rejects are reduced, the machinist spends more of his time producing acceptable parts. Furthermore, the machine seldom stops. Inspection — using the best tools and simplest methods available—is carried on as the machine is working.

Inspection of his own work is necessary in order for the machinist to keep to close tolerances, as described in his job-classification. Therefore up-grading is not necessary. The system has been employed successfully at Parker divisions in Cleveland and Los Angeles, and has received union endorsement in each instance.

Each operator must be convinced that the system is not for counting his mistakes, but rather is designed to increase the quality of the product he turns out. He must be shown that learning the use of new tools and learning his own capabilities, will make him a more valuable man and enable him to take more pride in his work.

For plants on standard or piecework rates it is essential that all time standards be reviewed, prior to installation of the system. Quality control should determine the frequency of inspection and adequate time must be allowed to the operator for checking.

Results

On the surface, this system might appear awkward and laborious. Actually, it becomes very simple after it is put into operation. Not only are less inspection personnel required in the egg-crate system, but there is also a large reduction in customer rejection. An improvement in overall efficiency of manufacturing is brought about by improved techniques accompanied by reduced costs for each unit produced.

end

EVER TRY TESTING BOMBER LANDING GEAR ON YOUR MACHINE TOOL WAYS?

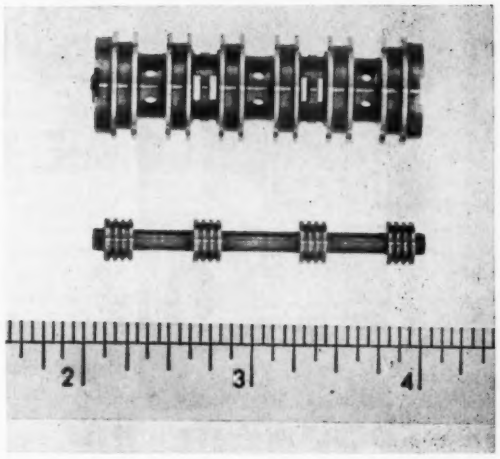
From hardened steel machine tool ways to test rigs for jet bombers, is slightly more than a hop, skip and jump. But one company made it, and here's how:

At the Langley Aeronautical Laboratory of the National Advisory Committee for Aeronautics, Langley Field, Va., a unique new research facility with power sufficient to haul loads of the weight of B-29 bombers up to take-off speed in less than 2 sec is now in operation.

This is primarily designed and built to test the landing gear of jets. The landing gear of a jet weighs about ⅛ of the plane's weight and contact stresses in landing and take-off exert strain on all parts of the plane. Stresses are accurately measured by fastening the gear to a drop rig supported by a 50-ton carriage (track mounted). When ready, the carriage is positioned at the end of a 2200 ft track where a tank contains water under 3260 psi pressure. This water is released from a 7" nozzle at a speed of 660 fps and hits a specially shaped brisket attached to the main carriage. This produces a thrust of 400,000 lbs, causing the carriage to accelerate to 150 mph under 400 ft and 3½ sec. At the desired speed, the landing gear on the test rig drops. Results include data on landing gear as a shock absorber, the physical nature of skidding during wheel speed, balance of tire, etc.

The vertical guide rail ways which guide the drop frame are made by The Ohio Knife Co., Cincinnati, O. A unique manufacturing and hardening process makes them virtually wear proof. Special analysis tool steel is eternally clad to a tough, easily machinable base of great strength. This process permits manufacture in extra long lengths without danger of warping or bowing. The Langley Field installation has O-Kni-Co ways in 313¼" lengths. The high wear resistant qualities are a result of special hardening done in electronically controlled furnaces giving a Rockwell C 64-66 to the full depth (3/16") of the tool steel. They are, of course, precision ground to tolerances of ± 0.0002 with low micro-inch finish. O-Kni-Co hardened ways, applicable to a great variety of machine tools, are carried in stock ready for immediate delivery. For new illustrated brochure, "Hardened Ways—Seven Cross Sections in over 60 sizes," write Dept. LL-83, The Ohio Knife Co., Cincinnati 23, O.

PARTS FROM THE SOLID



.....by small (or no) chip methods

SLEEVES AND SPOOLS FOR HYDRAULIC SERVO VALVES are prepared *from the solid* by a group of interesting machines. The valve components pictured above are used together in high speed aircraft and in guided missiles; and through the openings, created by their position one-to-the-other, flows the fluid which offers precise instantaneous action to the control surface power units. For precision service the sleeve and the spool (which is a slider inside the sleeve) must be made to close tolerances and carefully matched. Matching means that the overlap (positive or negative) of the spool land with the inside edge of the sleeve port cannot be more than 0.0002". These parts might conceivably be manufactured on some other production setup. However, we thought that this aggregation of equipment furnished by The Sheffield Corporation, Dayton, Ohio, probably is one of the best for the results expected.

Grinding procedure is prominently employed here with able assistance from electrical discharge and ultrasonic machining methods.

The "Crushtrue" wheel forming and dressing machine, popular for plunge grinding from the solid, is used to first prepare the sleeve and the spool for future operations by grinding the annular surfaces of both. The spools come to the grinder with centers for grinding, while the sleeve is ground on a precision arbor.

After form grinding, the parts are cylindrical ground to bring their OD's to tolerance. For example, the spool OD is held to ± 0.0001" with roundness and straightness to 0.000025".

It should be noted that normalizing, gaging, and other operations are performed between (or during) the metal removal operations discussed here.

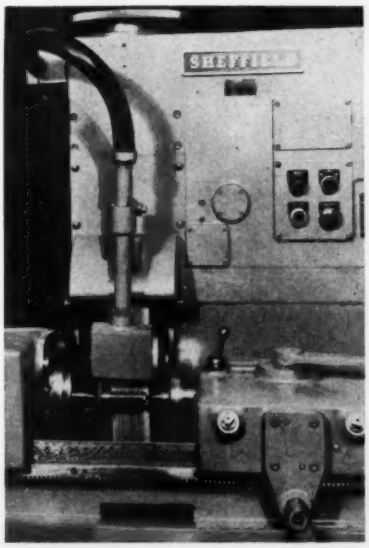
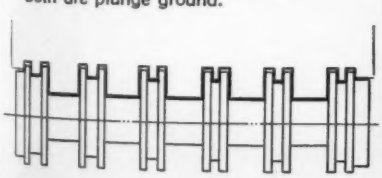


Fig. 1. The photo of the Sheffield Model 109 Crushtrue grinder is flanked by 2 drawings. On the left the sleeve, stock removal from the solid, is seen; on the right, the stock removal from the spool. Both are plunge ground.



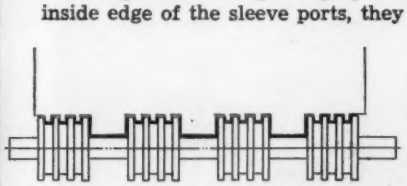
The next step performed on the sleeve is done with an electrical discharge, in which instance the ports are opened from the OD to the ID. This roughs in the ports leaving 0.007" to 0.008" on a side and the final sizing is done with an ultrasonic machine.

The difference between the electrical discharge operation and the ultrasonic operation is that the metal is eroded away by a high frequency spark in the former, while with ultrasonics the cutting tool drives abrasive grains into the work with ultra high frequency movement created by sound energy.

The final machining operation is the grinding of the land porting shoulders of the spool to match the position of the inside edge of the mating ports on the sleeve. This is the operation that really offers the "proof" as to what the "space vehicle" using these valves will do.

The two workpieces are mounted on their own respective tables on centers of the Micro-Form grinder (match grinder). These tables, after having been brought to correct relationship to each other by cross-hairs viewed through a microscope, are locked.

For light to aid in picking up the inside edge of the sleeve ports, they



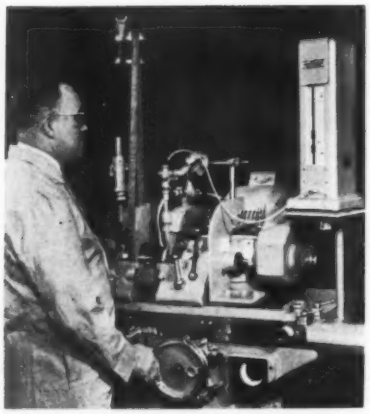


Fig. 2. On this Matrix 1A Grinder both parts are finish ground on the OD. The sleeves are ground on a precision arbor and the spools are held between centers. These locating surfaces are used throughout the process cycle.

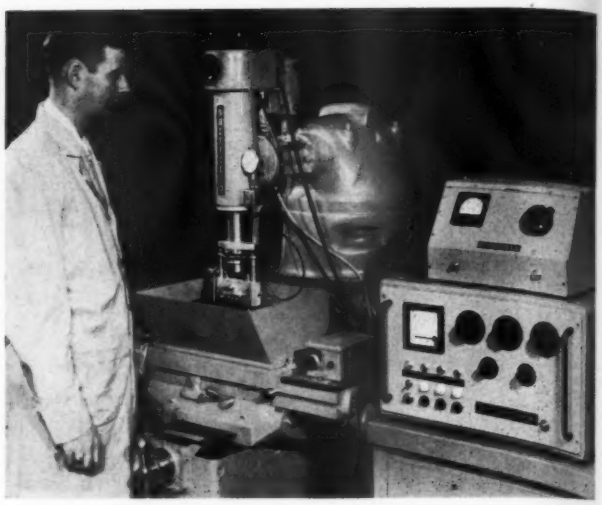
used an interesting little "grain-of-wheat" light inserted in the ID.

After parts are completed they are given an assembly flow test.

We thought it interesting that these parts were made without benefit of single point cutters — thus "small chip methods" prove to be a highly economical and efficient method of shaping hardened parts from the solid. We have only discussed here the equipment and procedures

Fig. 4. Then with the Sheffield Cavitron the ports are brought to proper finish and size. This is done by high frequency sound energy.

Fig. 3. Here, an electrical discharge erodes away port holes. Four ports are disintegrated through in one setup and 4 at 90° to these in the second. Stock is left for the next operation.

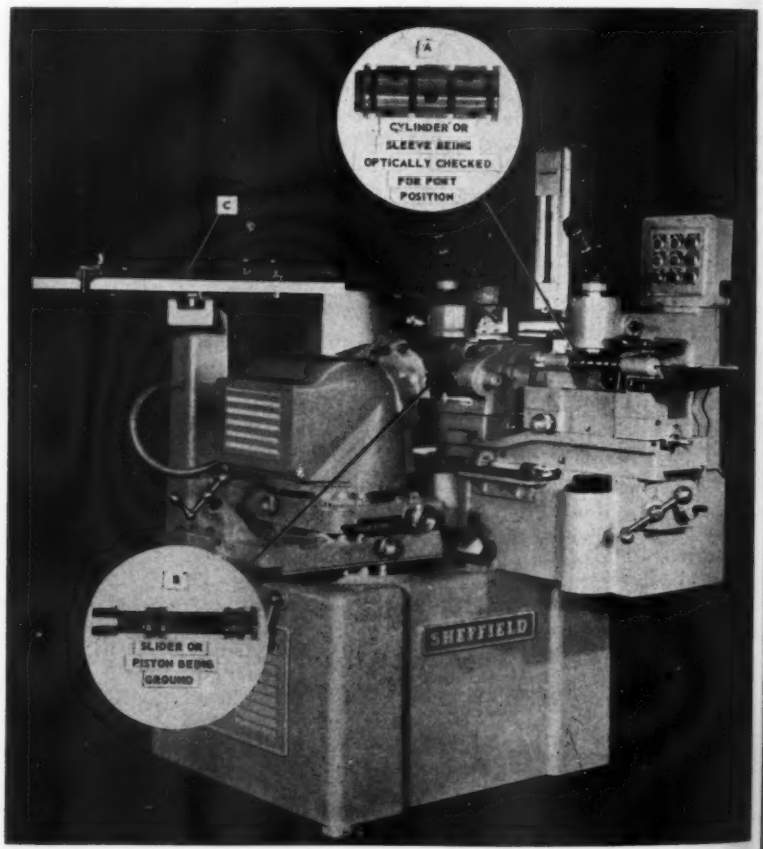


of grinding, disintegration and ultrasonics. Actually when we viewed the making of these parts, we saw a great deal of accessory equipment including many ingenious gages.

Now that you have read the sequence of operations, carry on for the story in pictures.

— W. E. H.

Fig. 5. And finally the Model 121-C Micro-Form Grinder (match grinder), the machine which accepts both parts for comparison by microscope. But more than that, it then grinds the spool so that its lands have the proper over or under lap with the ports of the sleeve—within ± 0.00015". After flow test, if correction is required the spool lands can be reground to position accuracies of ± 0.000010" using a Precisionaire Airetest Indicator on the same machine. The parts circled in the photo are a sleeve and spool other than those compared with the rule at the beginning of this article.



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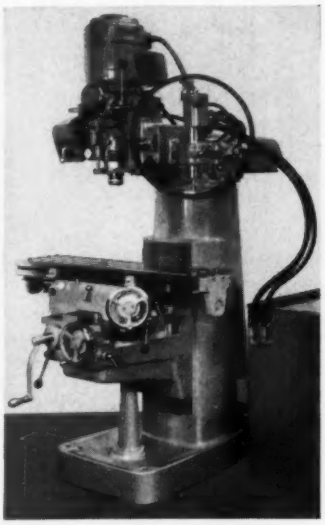
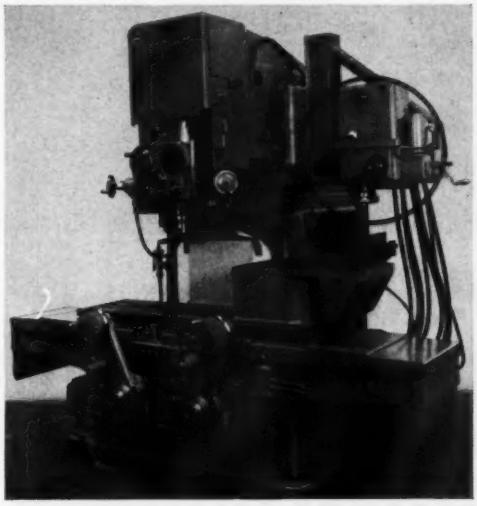
A BIG ADVANTAGE

In Making Fine Plastic Molds



CONTOUR MASTER

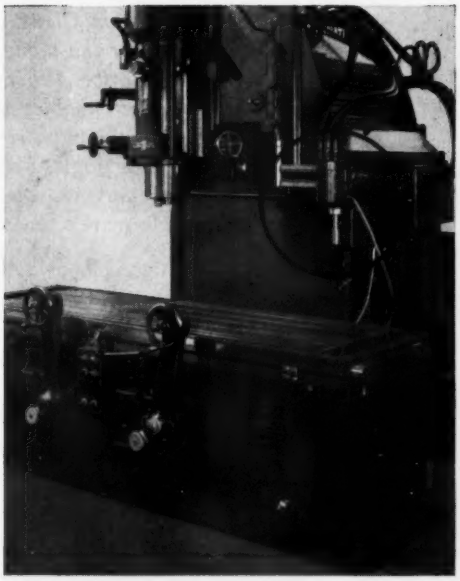
For small- to medium-size tool and die work. Table and saddle feeds are manually operated through anti-friction feed screws and nuts. Hydraulic tracing unit (encircled in red) scans the master to automatically control vertical movement of cutter spindle. Range, 16" or 22" table travel, 10" cross travel, 3½" vertical. Write for catalog No. M-1919-2.



16" VERTICAL HYDRO-TEL

For medium-size tool and die work. Table and cross slides are hydraulically actuated; effortless Servo control for hand operation; infinitely variable power feeds of 1 to 25 ipm. Two types of hydraulic tracing units available: automatic depth control, and combination automatic depth and 360° profiling (shown in circle). Range, 30"x16"; spindle drive, 5 hp. Write for catalog No. M-1497-1.

CINCINNATI



28" VERTICAL HYDRO-TEL

For machining large molds such as those required for dress forms, refrigerator doors, etc. Table and cross slides are hydraulically actuated; infinitely variable feed range of 1 to 25 ipm. Two types of hydraulic tracing units available: automatic depth control (in red circle), and combination automatic depth and 360° profiling. Range, 60", 96" or 120" x 30". Write for catalog No. M-1773-2.

Milling Machine Division
THE CINCINNATI MILLING MACHINE CO.
CINCINNATI 9, OHIO

CINCINNATI®

Knee Type Milling Machines • Bed Type Milling Machines • Die Sinking Machines Cutter and Tool Grinders

CIRCLE INFORM-A-GRAM KEY NO. 69

"CLAUSING 6300-SERIES 12¾" lathes are the best values on the market!" — FLYNN MANUFACTURING CO., Detroit

HERE'S PROOF OF PERFORMANCE...

"Without question, Clausing 6300-Series 12¾" Lathes give you more for the money than any lathe of comparable size or price. We especially like their heavy construction which enables us to take deeper cuts, and hold tolerances better on repetitive operations." This statement by Bill Rogie, Flynn Manufacturing Co., is typical of the reports we receive from Clausing owners everywhere. Here are a few of the reasons why:

Flame hardened bedways are standard equipment *at no extra cost.* Headstock, apron and quick-change box are totally enclosed and gears and shafts *travel in bath of oil* — another important exclusive. Spindle is forged steel with 1⅝" bore, hardened and ground ASA — L-00 tapered key-locked nose. Spindle turns on Timken "Zero-Precision" tapered roller bearings. Tail stock has No. 3 MT ram. Accuracy is *verified* by test report with each lathe.

Compare *all* the features. Compare price. See for yourself why Clausing is acclaimed the outstanding lathe value — *the* lathe for *your* shop.

CLAUSING DIVISION *Write for Free Literature* ATLAS PRESS COMPANY

11-115 N. PITCHER ST. • KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 70

NEW DEVICE PREDICTS METAL FORMING LIMITS

A surface elongation device which accurately predicts limits for the forming of high-strength aircraft and missile metals has been developed by Chance Vought Aircraft. Preliminary tests yielded accurate prediction of limits for forming titanium without rupture. This had not been successfully accomplished by the previous method of cup testing and indexing by physical characteristics.

The device consists of male and female v-shaped dies, the former dimpled to various depths. A coupon of metal is placed between the dies in a press and pressure is applied to the dies. Pins in the female die press the metal into the dimples.

The test produces a series of corner beads, with each adjacent bead being progressively deeper and thus requiring more elongation. The difference in each corner bead is controlled and requires 1% less elongation than the adjacent deeper bead for forming without fracture than the adjacent deeper bead. Measurement of surface elongation thus is reduced to counting the number of unbroken beads.

The device has been successfully used in a Guerin-type hydraulic press at maximum operating speed, and an estimated 40-60 coupons can be tested in an hour with one semi-skilled operator. The metal coupons do not have to be machined to close tolerances and special preparation is not required for their edges, as all measurements of elongation are independent of edge conditions. Two sets of gages or dies are required to cover all production run sheets of metal, one for testing 0.010"-0.040" thick sheets, and the other for 0.050" -0.1" thick sheets.

In developing the device, aluminum, titanium, and magnesium alloys were used and it was found that different tempers had no effect on its operation, provided they were within the capacity of the press being used.

YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 100 IN THIS ISSUE.

DoALL ECONOMY SPECIAL

Corner Rounding END MILL SET

When you pay nothing extra for top quality like this, you've found yourself a *real buy!*

These top-quality end mills are made of high-speed steel and are form-relieved. They can be sharpened without changing the form and size of the radius. Economical substitutes for arbor-type cutters used for rounding corners, they greatly reduce setup time. Set of eight in wooden block. Sizes 1/16" through 3/8" radius. No. D-638.

Individual sizes available through 1/2" radius.

Only $105.52

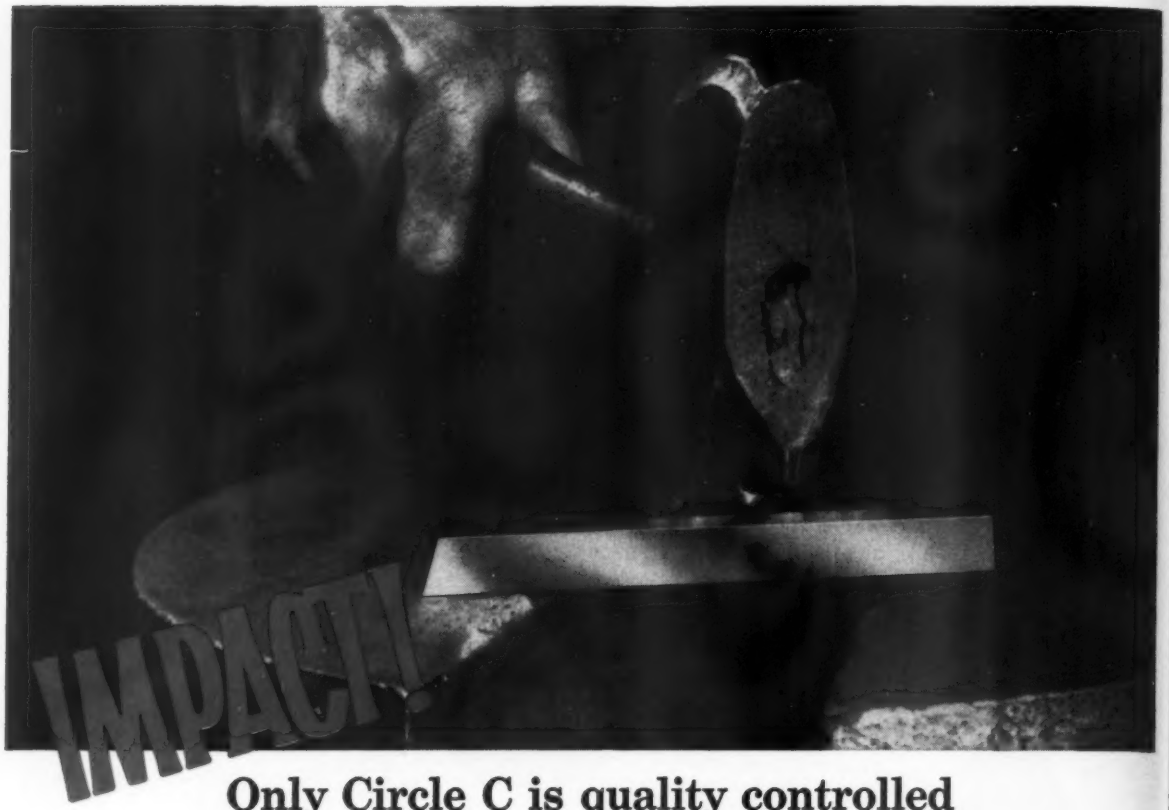
How Does DoALL Do It?
DoALL keeps prices low, yet gives you top quality through low-cost, nation-wide distribution and rigid laboratory inspection.—*Danny DoALL*

CT-40

CIRCLE INFORM-A-GRAM KEY NO. 71

Firth Sterling ...

PIONEER IN POWDER AND MOLTEN METALLURGY



Only Circle C is quality controlled by impact testing

Every Circle C High Speed tool bit is tested under impact to make sure you get the best bit that can be made. This is the final test in a series of quality control checks made during each stage of production, from Firth Sterling's exclusive double melting process to the finished bit.

Being double melted, Circle C has greater homogeneity that assures toughness and consistent performance, delivers cutting capacity far beyond that of ordinary high speed steels. With Circle C bits you can use higher operating speeds, obtain longer tool life and increase your production. And the practical, well balanced composition gives Circle C unusual red-hardness and wear resistance, provides ONE grade for almost all your machining operations.

Circle C is one of a family of outstanding high speed steels, including Van Chip, Blue Chip and Star-Mo, accepted throughout industry for reducing machining costs today. All are evidence of Firth Sterling's metallurgical leadership—a background of over 68 years of research and development.

* * *

*For assistance with your metallurgical problems, powder or molten, simply call your nearest Firth Sterling sales office or distributor. For complete information on High Speed tool bits—**and the new Circle C throw away inserts**—write for descriptive bulletin TBI-57:* FIRTH STERLING, INC., Dept. 11L, 3113 Forbes St., Pittsburgh 30, Pa. Offices and warehouses in principal cities.

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PRODUCTS OF Firth Sterling METALLURGY

HIGH SPEED STEELS • TOOL & DIE STEELS • STAINLESS SPECIALTIES • HIGH TEMPERATURE ALLOYS
SINTERED TUNGSTEN CARBIDES • HEAVY METAL • CERMETS • CHROMIUM CARBIDES
ZIRCONIUM • STERVAC & STERGON SUPER ALLOYS

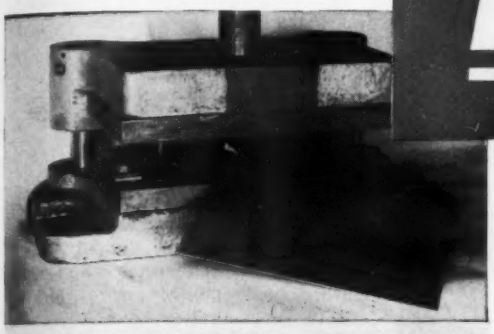
FIRTH STERLING TRADE MARK

CIRCLE INFORM-A-GRAM KEY NO. 72

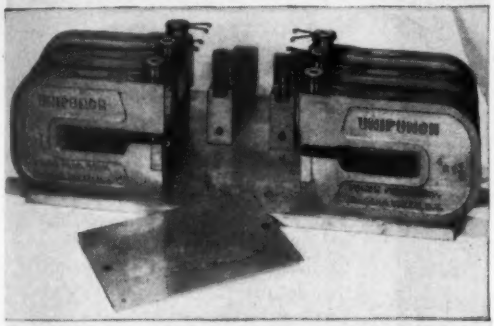
UNIPUNCH®

TOOLING IS MORE THAN A PRODUCT LINE . . .

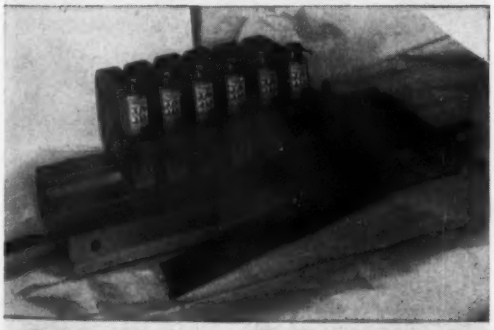
. . . IT IS A COST SAVING METHOD!



1 For cost comparison, the above custom made, single-purpose conventional die to punch 6 holes cost approximately $325.00.



2 Unipunch template set up of 6 units to punch the same six holes as the conventional die above, costs only $271.36.



3 Same 6 Unipunch Units as shown in photo No. 2 for punching 6 different diameter holes in angle requires only 6 punch bodies and 6 die buttons reducing cost of tooling second part to only $23.70. If same diameter holes were in this angle as in No. 2 work piece there would be no additional cost.

● The UNIPUNCH METHOD uses a wide range of standard interchangable units and parts to lower production costs. This method permits any number of units to be set up quickly outside the press, placed on press bed and produce finished parts with first stroke of press ram. Nothing is attached to press ram . . . down-time cut to minutes.

The same group of units may be set up in unlimited patterns keeping the tooling investment in continuous operation for greater savings. An example of these savings by the UNIPUNCH Method is shown at left. It's a great big economy story.

ALWAYS SPECIFY UNIPUNCH

Write Today ▶ for FREE Methods Book

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CIRCLE INFORM-A-GRAM KEY NO. 73

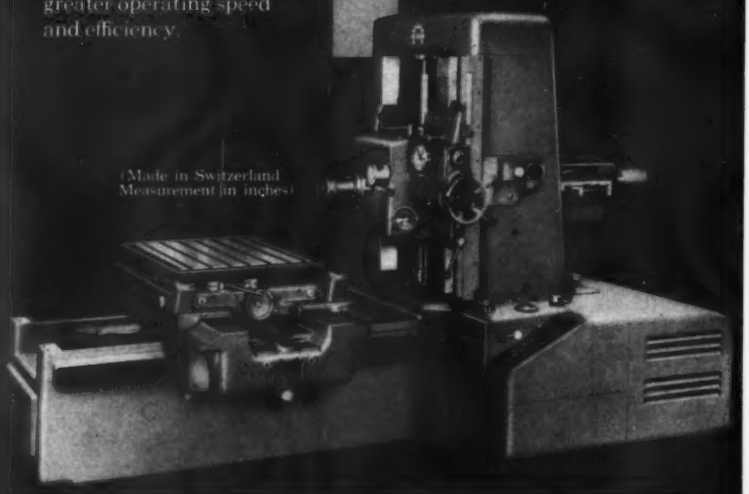
ACCURACY + VERSATILITY

the DIXI 75 gives you horizontal optical jig boring

- Projected optical setting—direct reading to .00005" for linear motions and 1 sec. of arc for built-in rotary table. Linear optics provided with adjustable zero reference.
- 3" diameter boring spindle
- Increased capacity: table size 39⅜" x 32"; 29⅝" cross travel; 23⅝" longitudinal travel; 25⅝" vertical travel

PLUS...

- Automatic positioning device available.
- Simplified controls functionally arranged for greater operating speed and efficiency.
- Hydraulic feeds and infinitely variable spindle speeds.
- Rear support optional.



(Made in Switzerland Measurement in inches)

MBI has engineers available for consultation, guarantees service by factory trained staff, and stocks spare parts in New York. — Join the long list of leading aircraft and manufacturing plants throughout the United States which are using the horizontal optical jig borer.

See the Dixi 75 at our Cleveland Demonstration Center (Sloan Machine Co., 18714 Nottingham Road, Cleveland, Ohio)

MBI

M. B. I. EXPORT & IMPORT LTD.

A DIVISION OF MACHINERY BUILDERS, INC.

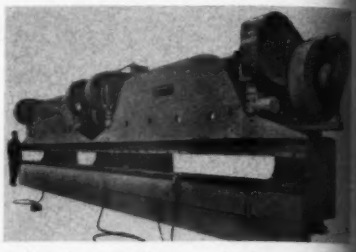
475 Grand Concourse, Bronx 51, N. Y.

"Over 25 years' experience in designing and building machinery."

CIRCLE INFORM-A-GRAM KEY NO. 74

TWO PRESS BRAKES MADE TO FUNCTION AS ONE MACHINE

Two Cincinnati press brakes, No. 9 series, each rated at 150 tons bending capacity, have been built to perform as a single machine. They have a throat clearance of 20" and provide a 36'-0" overall die surface. The adjacent eccentric shafts of the two machines are equipped with a



splined coupling, which can be shifted easily to permit operation as one press or as individual machines.

Limit switches are installed throughout to guard against damage to the machines, either when operating independently or as a unit. Both press brakes have two-speed transmissions that provide ram speeds of 7½ or 30 strokes/min.

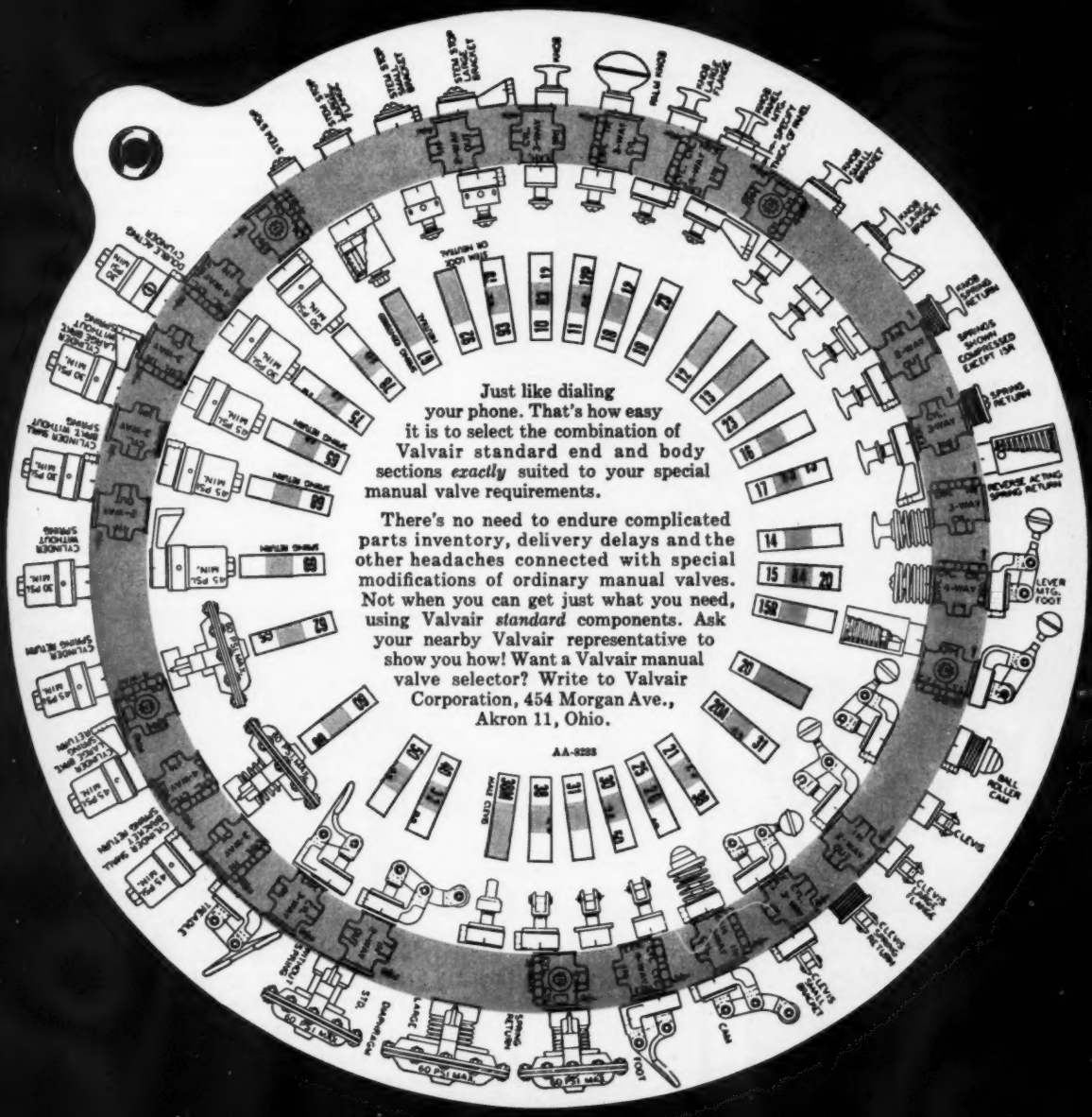
MASS PRODUCTION FOR AUTOMATION

Mass production for automation is exemplified by these 42 fixtures, identical within close tolerances, that are for use on Buhr Machine Tool's 26-station Economatic. Although fabrication of fixtures usually involves a lot of "cut-and-try," the details for these particular fixtures are all interchangeable.

Precision in mechanized production has been one of the main design goals of these fixtures. Gage-block reference points have been built into them for on-the-spot checking of parts while they are clamped in the fixture.

After parts have been machined, fixtures and parts go back to the unload station on a return conveyor, passing through a washing machine.

. . . unlimited combinations using standard components!



Just like dialing your phone. That's how easy it is to select the combination of Valvair standard end and body sections *exactly* suited to your special manual valve requirements.

There's no need to endure complicated parts inventory, delivery delays and the other headaches connected with special modifications of ordinary manual valves. Not when you can get just what you need, using Valvair *standard* components. Ask your nearby Valvair representative to show you how! Want a Valvair manual valve selector? Write to Valvair Corporation, 454 Morgan Ave., Akron 11, Ohio.

AA-9283

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Compare and you'll buy

alvair

Immediate delivery from local stock

Representatives in principal cities

JIG BORING
and
Large Precision Machining
Done to your specifications
We Have
22 Jig Borers
KIDDE PRECISION TOOL CORPORATION
10 Locust Ave., Roseland, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 761

NEW *Baj* ONE-PASS
KEYWAY PUSH BROACH

This non-adjustable version of the Glenny Adjustable Expansion Broach (formerly produced by the East Shore Machine Co., Cleveland, Ohio) introduces these outstanding features:

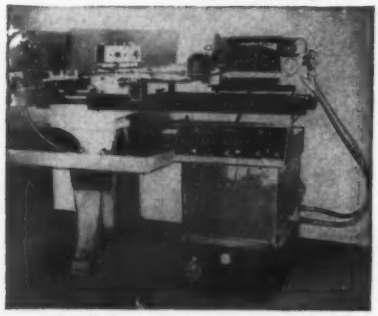
- FAST, EASY OPERATION
- REPLACEABLE HIGH SPEED STEEL CUTTING BLADE
- EXCLUSIVE BODY DESIGN
- HIGH ACCURACY—to .0005 plus or minus
- LONG LIFE—up to 100,000 keyways without replacing.
- WIDE RANGE OF STANDARD SIZES

Write for Details. Exclusive Distributor Territories Open.

The Baj Tool Company
(Manufacturers of Baj and Glenny Broaches)
19751 St. Clair Avenue
Cleveland 19, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 762

ACME HYDRIVE
increases production up to **100%**



. . . and makes a hand operated turret lathe dependably automatic.

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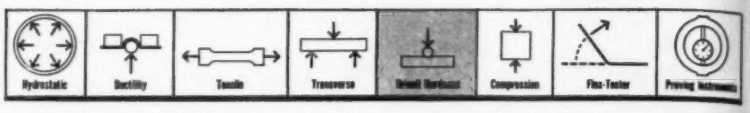
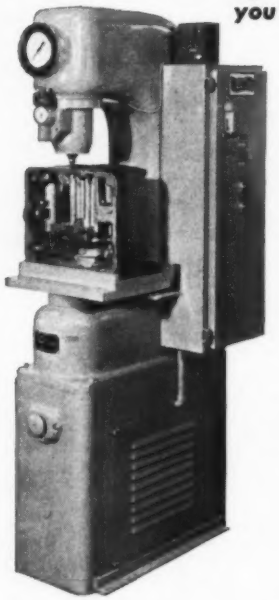
CIRCLE INFORM-A-GRAM KEY NO. 763



hardness tests increase plant capacity

By knowing the hardness of incoming parts you can reduce number of processing steps



Every production program has a bottleneck. Steel City Brinell testers can stop the broken-tool bottlenecks caused by too-hard parts.

For example, a maker of transmission cases has solved two problems with one "Color-Glance" tester. All incoming cases are tested; only hard ones need be annealed. Tool breakage is minimized, and limited annealing capacity is not overloaded.

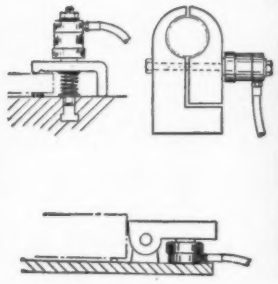
Steel City "Color-Glance" Brinell hardness testers are high-production units. Relative hardness is shown by colored lights to reduce errors and fatigue. Optional equipment: workpiece locators, conveyor sections, counters, etc.

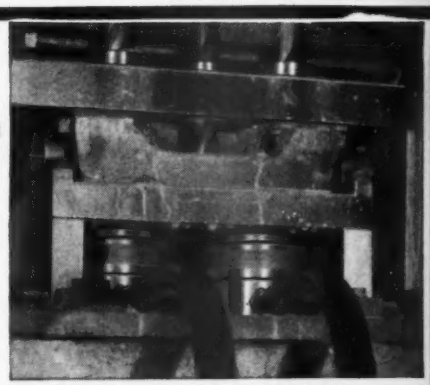
Steel City has solved many hardness-testing problems—laboratory, low-volume, portable. A standard machine may meet your needs.

Tell us your testing problem; ask for literature.

Steel City Testing Machines Inc
8815 Lyndon Ave., Detroit 38, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 764





HYDRAULIC FIXTURE LOCKING COMPONENTS BOOST MACHINE OUTPUT!

- Compact—Build into fixtures easily!
- Automate your fixtures for fraction of "do-it-yourself" cost!
- Ultimate speed in work loading!
- Greater locking force than any other method!
- A permanent investment—transfer from fixture to fixture!
- Single or multiple locking heads available with matching air-hydraulic booster systems!

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WILTON TOOL MFG. CO. INC. TP-118
SCHILLER PARK, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 765

SHAPER FIRMLY HELD BY FRICTION MOUNTS

A 7800-lb 24" universal shaper, operating at 120 cuts/min with a 4" stroke, is held down to a total oscillation of only 0.022" with Wedgmount machinery mounts. The Gould & Eberhardt shaper, installed without bolts or cement on six 3" x 6" Wedgmounts, showed this low oscillation and did not "walk," according to an indicator dial at the base of the machine during operation.

Patented "Air-Loc" pads on the top and bottom surface of each mount provide the high degree of friction required to hold the machine in place despite its strong lateral thrust. Precision leveling is achieved by simple adjustment of a bolt within each mount before operation.

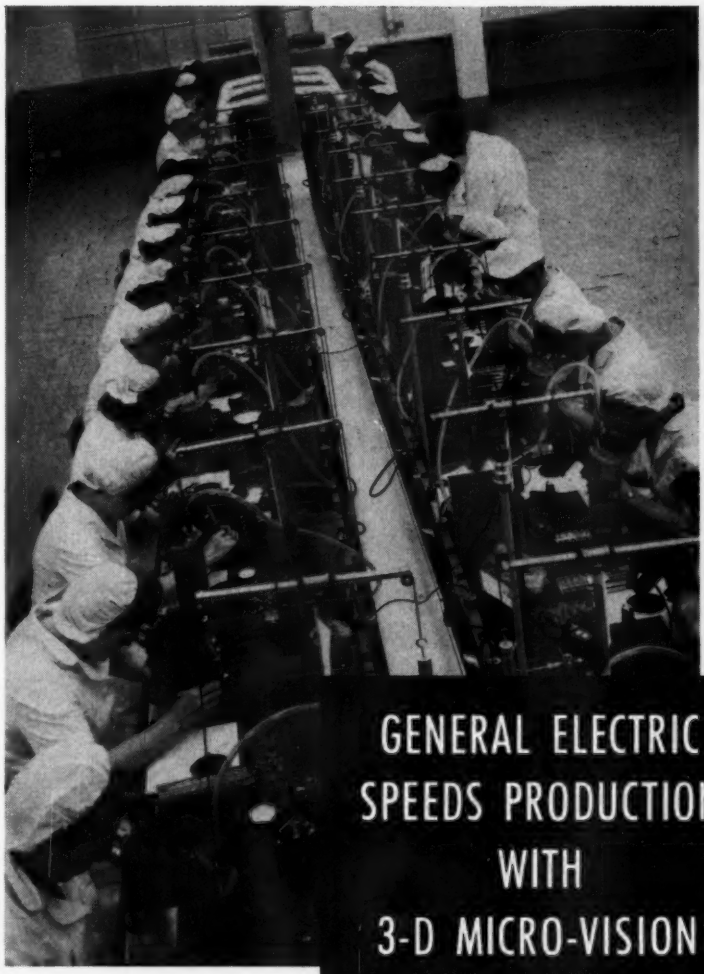
TRANSFER MACHINE LIFTS AND CARRIES PARTS, NO PALLETS

A unique feature of a new 29-station machine, built to assemble V-8 cylinder heads at a rated capacity of 310/hr, is the transfer mechanism which lifts and carries the parts between the stations, eliminating pallet fixtures necessary in older assembly machines.

Cylinder head castings with intake and exhaust valves in place are loaded automatically at Station 1, while at Stations 3, 4, and 5 rubber grommets are placed over the valve stems. An inspection is made for faulty valves and grommet positioning at Station 7, and if necessary, heads are removed, repaired, and returned to Stations 8, 9 and 10.

Valve springs, spring retainers, and spring retainer sleeves are automatically assembled at Stations 11, 13, and 15, respectively. Valve locks are automatically assembled at Stations 17 through 23, with standby units for manual assembly at Stations 19 and 23. All valves are "popped" at Station 25 before the finished assemblies are unloaded at Stations 27, 28, and 29.

Building block construction provides flexibility for engine design changes and for additional automatic assembly devices in the future. As in other Cross-built machines, all parts, including tooling details, are made to interchangeable tolerances for fast, easy maintenance.



How B&L Stereomicroscopes help in assembly of ultra-precision transistors

These skilled operators are doing a job that "just couldn't be done without stereomicroscopes," according to Norman Spoonley, foreman, Semiconductor Products Dept., General Electric Co., Buffalo. This critical phase of transistor assembly involves soldering a 1-mil nickel wire between a nickel tab and the .6-mil core of a .1" germanium pellet which, in turn, is fused between two 5-mil nickel wires. B&L Stereomicroscopes make it possible by showing enlarged views in natural 3D. Air-tight, dust-free design keeps images sharp, clear, undistorted . . . for full-working-day efficiency without visual fatigue. In assembly, quality control, inspection, some 100 B&L microscopes help G. E. mass-produce to highest precision standards. If you have small-parts assembly and inspection problems, you need B&L Stereomicroscopes.

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☐ I'd like to borrow a B&L Stereomicroscope for 15-day trial without cost or obligation.

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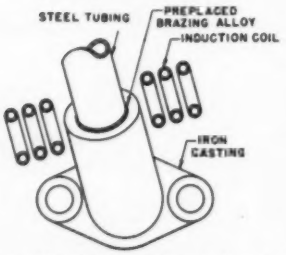
CIRCLE INFORM-A-GRAM KEY NO. 77

The Lepel Line of induction heating equipment represents the most advanced thought in the field of electronics as well as the most practical and efficient source of heat yet developed for industrial heating.

If you are interested in induction heating you are invited to send samples of the work with specifications. Our engineers will process and return the completed job with full data and recommendations without any cost or obligations.

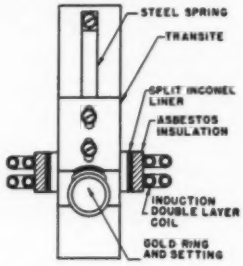
TYPICAL INDUCTION HEATING APPLICATIONS

IRON CASTINGS BRAZED TO STEEL TUBES



Assembly of iron castings and steel or copper parts are facilitated by induction heating. Arrangement is illustrated for silver brazing malleable iron castings to steel tubing. Coil design shown provides uniform heating for joint. Proper joint design assures high bond strength. Electrolytic treatment of castings to remove carbon (Kolene Treatment increases strength and tightness of joint to gases and liquids.

GOLD BRAZING IN JEWELRY INDUSTRY



Liner type induction coil shown provides a flexible arrangement for brazing settings to gold rings. The simple fixture facilitates handling. The unique coil design permits heating by induction and by radiation from heated metal liner. Ring, setting and gold brazing alloy are pre-assembled in a ceramic jig and then moved into heating position within the coil for brazing.

CUTTER BLADES SELECTIVELY HARDENED

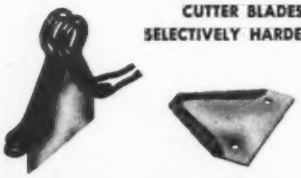


Photo shows coil design and arrangement used to selectively harden edges of cutter blades used in agricultural equipment. In production, cutter blades are automatically fed between layers of the induction coil, selectively heated and then oil quenched at the rate of one per second. Hardness at the cutting edge is Rc 62/64. Distortion is negligible.

Electronic Tube Generators from 1 kw to 100 kw.
Spark Gap Converters from 2 kw to 30 kw.

WRITE FOR THE NEW LEPEL CATALOG . . . 36 illustrated pages packed with valuable information.

All Lepel equipment is certified to comply with the requirements of the Federal Communications Commission.

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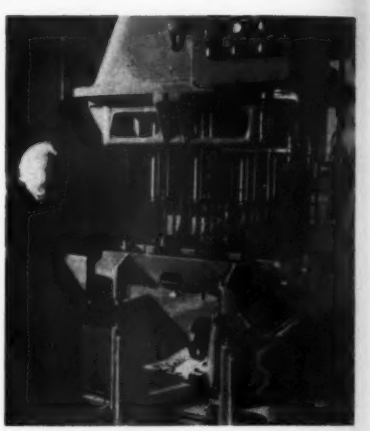
55th STREET and 37th AVENUE, WOODSIDE 77, NEW YORK CITY, N. Y.

CIRCLE INFORM-A-GRAM KEY NO. 78

15-Spindle Machine Has Fast Setup Change

Drilling and reaming six sizes of generator field wedges requiring two hole spacings, is done successfully at General Electric with a standard 15-spindle Natco. Fifty-two possible combinations of material, length, hole spacing, and number of holes may occur in a single generator. The new machine handles all of these variations in a floor-to-floor cycle of 2 min for aluminum and 8 min for stainless.

The machine, built by National Automatic Tool Co., Inc., has a workholding fixture mounted on a 4-position straight-line indexing table. Parts are loaded and unloaded at the first position and automatically cycled for drilling, core drilling, and reaming in the remaining positions.



The 15 spindles, driven through universal joints, are located by a slip spindle plate mounted to the head. Tools are guided by bushings in the bushing plate which lowers into position as the head feeds down.

The slip spindle plate is bored for 30 positions. To change from one hole spacing to the other (2½" and 3"), spindles are slipped out of the plate and relocated in the second set of bores. The bushing plate has 30 bushings to line up with either set of locations.

When hole spacing is changed, the fixture is moved to a new position on the table so as to line up. Setup time to change hole spacing is 55 min. If a different style part is involved, workholding jaws in the fixture are also changed. This takes 23 min.

Twelve speeds from 168 to 1675 rpm, and infinitely-variable hydraulic feeds from 1 to 15 ipm, are quickly and easily selected to accommodate different materials.

CARBIDE SCARFING TOOL UPS WELDED PIPE PRODUCTION

Scarfing the external and internal weld bead on continuously welded pipe presented a serious problem to the Beall Pipe & Tank Corp. Their production on the pipe was about 6000'/shift in 40'-50' lengths on 4" to 16" OD pipe. A weld bead of about ⅝" wide and ¼" thick was being laid down at 1500° to 1800°F at the point where it was to be scarfed. The feed was about 35 fpm. Trouble came at the cutting edge,

with the metal bead sticking to the cutting tool, causing production to be delayed. The machine had to be shut down about every 6000' due to tool breakage and wear.

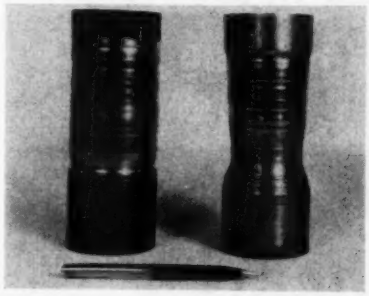
Recently they switched to Allegheny Ludlum's Carmet grade CA-610 carbide indexable insert, and have been getting 10,000' of pipe per single indexable insert. The feed has been increased to 50'-60' fpm. In addition, the weld bead is now cut in a continuous stream, and the scrap ribbon is automatically wound on a scrap spool simulating ribbon stock when finished, as shown in the illustration.

HARD-SURFACING EXTENDS LIFE OF OIL-PUMP SLEEVES

The effectiveness of hard surfacing is demonstrated in this case history and photo, which shows two pump sleeves after service in the same Desalta charge pump moving raw crude oil, a fluid known for the extremely abrasive nature of the many foreign particles it carries.

The pump sleeve at the right was fabricated of 361 stainless steel. This sleeve was removed after 105 days in service. The severe wear encountered is obvious.

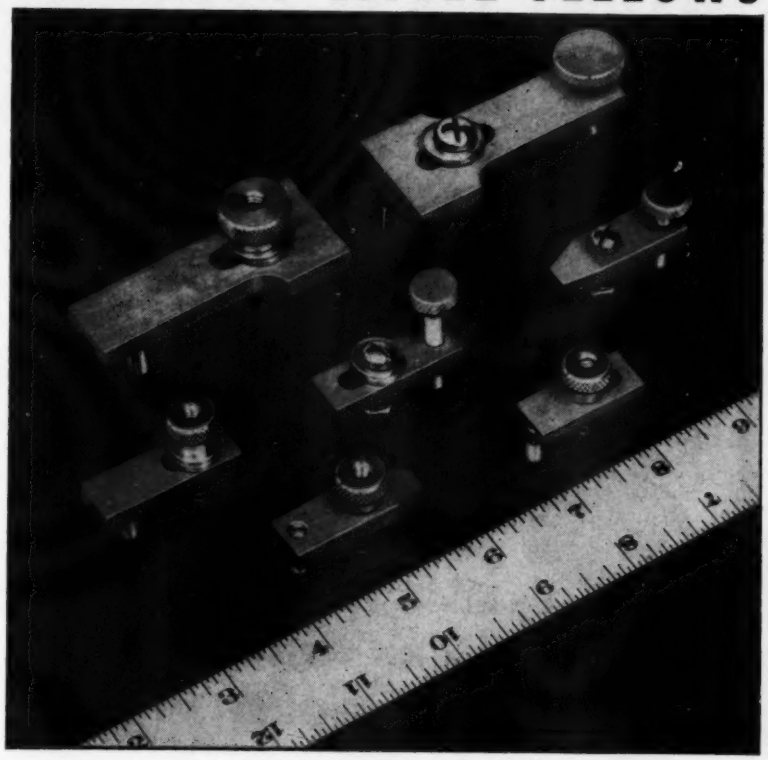
The pump sleeve at the left was fabricated of carbon steel and overlaid with Colmonoy No. 6 powder, manufactured by Wall Colmonoy Corp. and applied by the Spray-weld process. Colmonoy No. 6 is a



nickel-base alloy containing chromium borides as well as chromium carbides. When removed after 13 months in service, the hard-surfaced sleeve had worn the slight amount shown.

An additional benefit obtained in this case was increased packing life. The packing had to be changed eight times during the 105 days the stainless steel sleeve was in service, whereas the packing was changed just once in 13 months when the hard-surfaced part was substituted.

LODDING'S LITTLE FELLOWS



- **Non-magnetic - stainless steel type 303**
- **Tensile strength 90,000 p. s. i.**
- **Heat resistant - austenitic series (not affected by heat treatment with high resistance to scaling and distortion)**
- **Corrosion resistant (high resistance to many corrosives including acids)**

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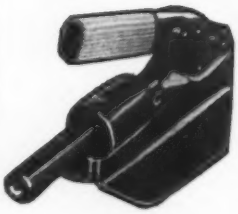

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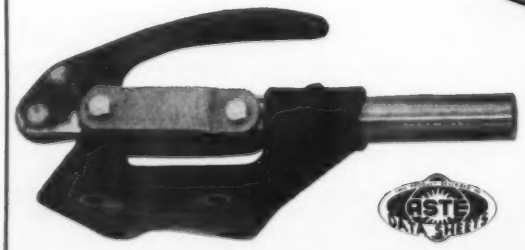

ASTE DATA SHEETS

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LIQUID SEALANT LOCKS JET FUEL PIPE PLUGS

A self-hardening liquid sealant is used in the Hamilton Standard Jet Fuel Control to lock and seal over 20 pipe plugs against jet fuel at pressures up to 800 psi. The 1/8"-3/16" dia sealed plugs resist loosening from vibration and shock.

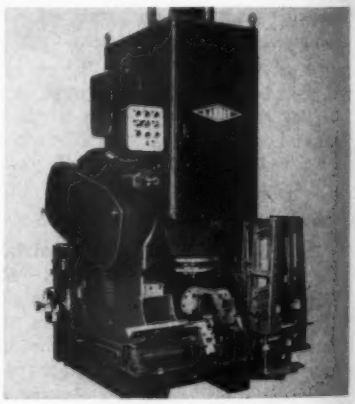
The thin liquid sealant, Loctite, made by American Sealants Co., has the consistency of light penetrating oil and hardens only when confined between closely fitting metal parts in the absence of air. Hardening with less than 5% shrinkage, it fills all voids in the joint and insures a positive seal. Any sealant outside the joint remains liquid and can be wiped off or removed with a degreasing solvent.

Hardened Loctite is not affected by water, fuels, hydraulic fluids, or degreasing solvents and has been successfully used to seal against CO_2, oxygen, and Freon. It can be used to seal nitrogen, acetylene, and liquid petroleum.

NEW TAPPER FEATURES HIGH PRODUCTION PRECISION THREADING

Only visual inspection and magazine loading are required by the operator of the new 77TA Landis automatic coupling tapping machine.

Designed for precision threading of oil tubular and commercial couplings ranging from 2-7/8" drill pipe external upset to 9-5/8" long thread



casing couplings, the machine is pneumatically operated and electrically controlled. Maximum cycle speed is 100 cycles/hr for double indexing of couplings tapped from both ends, and 120 cycles/hr for single indexing when tapping straight through. Standard merchant and many special couplings also can be tapped on a high production basis.

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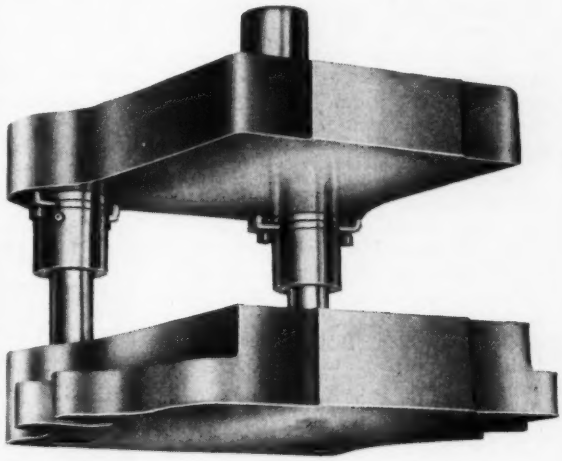
Danly's Open Back Inclinable Presses bring big press efficiency to the small press field.

Each O.B.I. Press – capacities from 25 to 200 tons – is equipped with the exclusive Danly Air Clutch and Brake. This Clutch gives these presses all the reliability and flexibility of operation of the Danly Straight Side, Underdrive and Autofeed Presses. The clutch of "low inertia" design wears less because of low weight load picked up on each engagement. It runs cooler and costs less to maintain.

The ruggedness of heavy welded steel frame construction engineered into all Danly Presses, features this new O.B.I. line. The rugged construction throughout minimizes vibration, deflection and breakage. In combination with Danly Air Friction Clutch it assures long press life—continuity of production—accurate stampings—low cost of production and maintenance. This new line is priced for economy.

in **DIE SETS**
and Die Makers' Supplies



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Stocked and assembled in 20 tool-making centers

Now all Danly Precision and Commercial Die Sets are assembled with demountable bushings and press-fit guide posts—to provide the most accurate die sets on the market. Chance of distortion is minimized. Posts and bushings are pre-fitted to dimensions, within tolerance, at the factory and furnished as matched units in all die sets. Pre-fitting is so accurate that bushings and guide posts are completely interchangeable.

To this new precision, Danly also adds unequalled availability made feasible by this new method of assembly. These die sets are stocked for prompt assembly and delivery by 20 factory branches and distributor assembly plants throughout the country. Your local Danly outlet is your source for die sets and toolroom and pressroom supplies that bear the stamp of leadership.

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to the Stamping Industry

HYDRAULIC CYLINDERS ARE ASSEMBLED TO SUIT SPECIFIC APPLICATIONS

Wooster Division of Borg-Warner Corp. announces a new line of hydraulic cylinders for industrial applications, which can be assembled from a variety of standard rod ends and head ends for specific needs.

These cylinders can be used on lift trucks, for example, for heavy-duty applications, and on precision machinery for fine control. Offering a choice of up to five rod ends and two different head ends for any type of cylinder, the new units provide a flexible selection and cover a wide range of styles and working pressures.

Double-acting and single-acting cylinders are available for both general and special purpose applications. Single-acting types come in either piston or displacement styles; double-acting units are available in piston style only. Working pressures range from 1250 to 3000 psi with intermittent working pressures up to 4000 psi for some double-acting units.

Circle Inform-A-Gram No. D1

HIGH STRENGTH STEEL CUTS TREATING COSTS

An improved high-strength, stress-stabilized, free-machining, cold-finished bar steel, saves costs in production of wear-resistant parts by eliminating, in most cases, the need for heat treatment during fabrication. Users of Jalcase 100 reportedly have obtained exceptional tool-life performance. In one case, a machinability index of 82% was attained.

The steel, produced by Jones & Laughlin, has a guaranteed minimum yield strength of 105,000 psi in round sizes for diameters up to 1-½", 100,000 psi from 1-½"-3", and 90,000 psi over 3". It has a guaranteed minimum hardness of 248 Brinell in round sizes up to 1-½", and 241 Brinell for larger sizes. These features make it especially suitable for applications where its strength and hardness are sufficient without the need for heat treatment of finished parts.

The advanced processing technique used by J&L to produce Jalcase 100 also results in stress control to prevent distortion after machining. Chemical analysis of Jalcase 100 is equivalent to AISI grade C-1144.

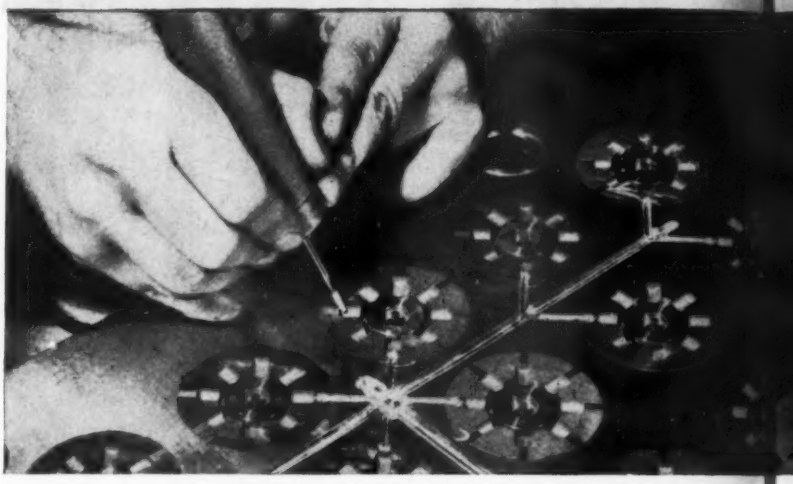
BATTERY OF MACHINES USED FOR LOW-RUN MANIFOLD PRODUCTION

Three new special milling and drilling machines, used as a battery to economically produce automotive intake manifolds in low production quantities, have been designed and built by Snyder Tool & Engineering Co. One — a line index machine — rough and finish mills the manifold joint faces; another drills and reams locating holes; and the third mills the water flange and carburetor mounting pad surfaces. One operator runs each machine and performs loading, pushbutton cycle, and unloading operations.

In the first machine, a manifold is loaded upside-down in a line index fixture and fed under two angular milling units, each having one rough and one finish milling cutter, for milling of joint faces in a single pass. The part and fixture unit are returned to the initial position for unloading. Snyder estimates a maximum production rate for this machine of 53 pcs/hr.

After the joint faces are milled, the manifold is placed on slide rails

32 ALUNDUM Abrasive for your tool and die jobs* 32



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"Making better products . . . to make your products better"

Norton mounted wheels are hitting new highs in grinding efficiency. Outstanding new developments in abrasives and wheel construction eliminate loading and glazing, assuring best possible results in:

TOOL AND DIE GRINDING

Norton mounted wheels with sharp 32 ALUNDUM abrasive and VBE bond are the very best performers.

Advantages: Wheels need no costly dressing; hold form; give constant cutting action — right down to the mandrel.

ROUGH GRINDING

For steel castings and weldments, mounted wheels of tough 44 ALUNDUM abrasive with VBE bond, and metal-mounted, are unequalled.

For snagging cast iron, wheels of sharp 32 ALUNDUM abrasive with VBE bond, and metal-mounted, outperform silicon carbide wheels consistently.

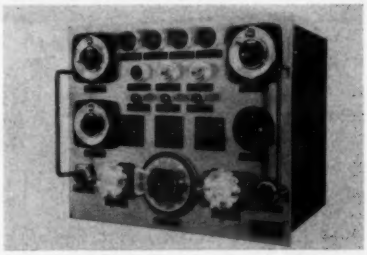
Advantages: Norton wheels give you the fastest cutting rate, with a marked increase of stock removed per wheel.

and hydraulically-clamped in the second machine for drilling by four-spindle drilling heads on each side of the machine. Two of the spindles in one of the heads utilize combination drill and reaming tools to provide reamed holes for subsequent operations. The part is then slid on rails to the opposite side of the machine, where it is unloaded on a roller-type conveyor. Estimated maximum production rate for this operation is 102 pcs/hr.

In the third machine, the manifold is placed on slide rails and hydraulically-clamped for milling of the water flange and carburetor pad surfaces by two separate milling heads. The water flange is milled by a cutter that traverses across the end of the part, while the carburetor pad is milled by a cutter that travels across the part in an angular path to the plane of the joint faces. A spacer-type mounting for the pad milling cutter permits machining of selected pad heights for different manifolds. This machine has an estimated production rate of 53 pcs/hr.

DIALING SIMPLIFIES SHORT RUN PRODUCTION

This control panel is part of a new automatic positioning system that uses a direct-dialing analog programmer for quick short-run machine setups. Developed by CDC Control Services, Inc., this time saver can be used on machines doing operations such as punching, drilling, and inserting.



Uncoded programming data can be fed into the unit for repetitive and symmetrical motion patterns. For example, a setup involving five different dimensions and three different repeat commands can be programmed by setting eight adjustment dials. For variations, just reset the dials.

Its capable of 0.2 sec/basic motion positioning speed, with 0.001 position accuracy. The modulated signal gives infinite adjustibility.

This system is also available for non-repetitive or contour programming from CDC Control Services, Inc., 686 S. Warminster Rd., Hatboro, Pa., or— **Circle D2**

DEATHS

Edward A. Cowles, 88, founder and president of Cowles Tool Co. for 37 years until his retirement in 1954, died in Cleveland in late August.

Herbert A. Stanton, 71, former president and director of Norton Behr-Manning Overseas, Inc., and vice president and director of Norton Co., died Aug. 26 at his home in Harwichport, Mass.

Alexander Neilson Aird, 55, vice president in charge of the Baltimore Division of Revere Copper and Brass Inc., died early in September in Baltimore.

Raymond P. Kells, 58, chief service engineer for Latrobe Steel Co. and expert in the application and heat treatment of high speed steels, died early in September in a Pittsburgh hospital.

O. S. McGuffey, 62, former chief engineer at Tranter Manufacturing, Inc., Lansing, Mich., died in September.

32 or 44 ALUNDUM Abrasive for your rough grinding

METAL-MOUNTING — Another Norton Exclusive — You throw nothing away but the mandrel!

Norton mounted wheels are so securely anchored to the mandrel — *you use all of the abrasive!* This radically improved method of locking the abrasive body to the mandrel is used on most mounted wheels of 5/16" diameter and larger. Molten metal, injected into the abrasive recess at high pressure, does it — and does it fine!

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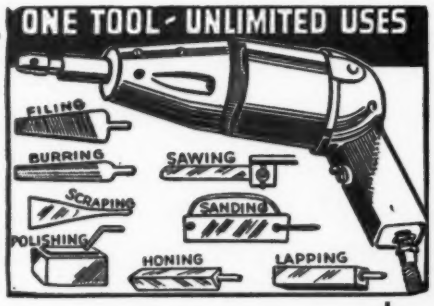

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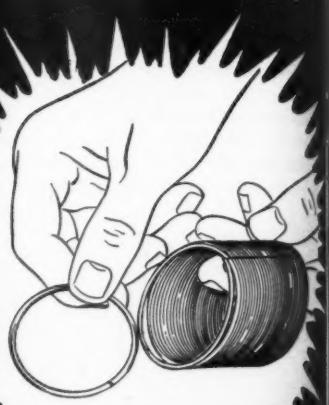

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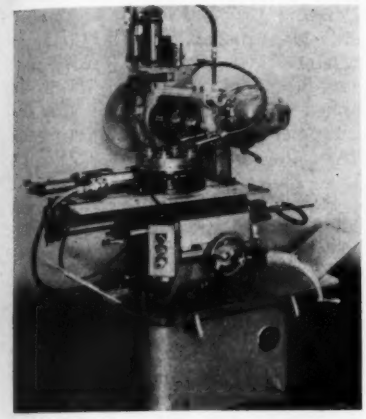
A UNIQUE STRADDLE MILLING JOB

A clever technique for milling squares on small parts takes advantage of the flexibility of the Nichols semi-automatic miller equipped with a 4-station, 10" dia automatic pneumatic indexing table.

While the miller is in operation, the indexing table brings each part under two pairs of straddle milling cutters, leaving two stations free for loading and unloading.

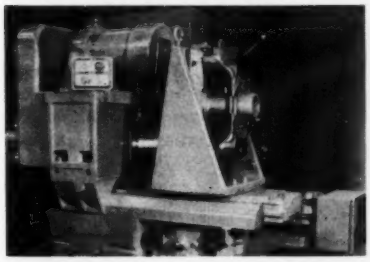


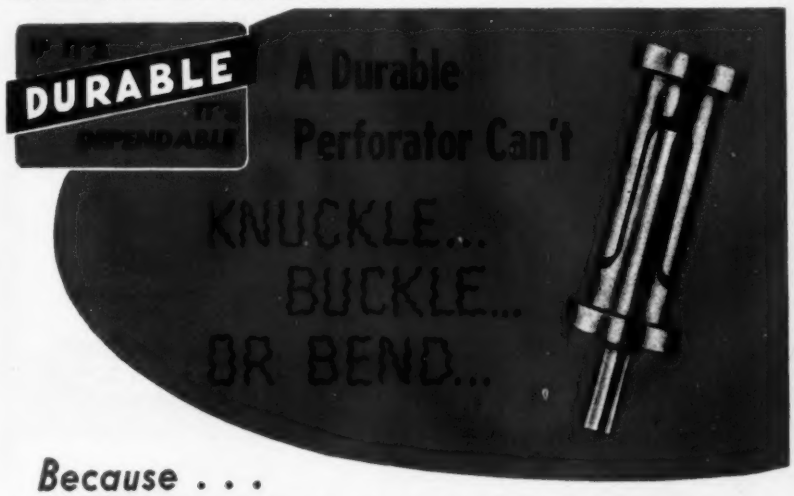
Automatic pneumatic down-feed to the spindle is synchronized with table feed and automatic indexing of the rotary table. Two sides of the square are milled with each indexing cycle, the square being completed after one 90° index of the rotary table. Feeds are variable up to 60 ipm, and timing is adjustable to suit the dexterity of the operator. The equipment is available from The Robert E. Morris Company.

ECONOMICALLY-TOOLED SMALL BORING MACHINE DOES RUGGED JOB

Designed especially to meet small scale production requirements, the Ex-Cell-O Style 2112-B precision boring machine can feature simple, low cost tooling and do rugged jobs. An example is the machining of a heavy cast iron clutch housing for a medium truck. The operation is to face and precision bore the starter motor mounting, rough and finish operations being required in one machining cycle. The fixture, of rugged construction, utilizes cam-action hand clamping and dowel pin location.

The operator clamps the part and starts the cycle. Rapid traverse brings the component to the tooling, which is mounted on a standard hydraulically-operated Ex-Cell-O facing head. This facing head is tooled so that initial movement takes roughing tools into depth, roughing the shoulder faces and plunging the bores. Subsequent movement in the opposite direction carries a second set of tools into position, permitting finishing of these surfaces. Tooling is set so that when the table feeds out the bore diameters are finished, leaving no drag lines. After feed out, the table and facing head retract to start position.





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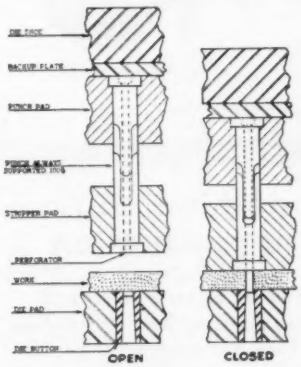

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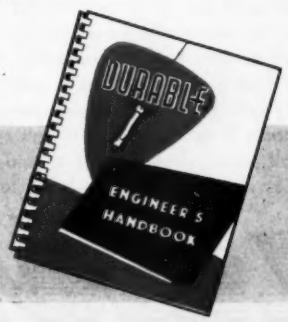

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Management

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A Digital Control Computer, which can be used for process control, data logging, and test facility applications for computer control systems is detailed in a bulletin. Specifications for the transistorized RW-300, which operates with a wide range of digital input and output equipment, are given in this bulletin available from The Thompson-Ramo-Wooldridge Products Co., P. O. Box 45067, Airport Station, Los Angeles 45, or — **Circle Inform-A-Gram No. F2**

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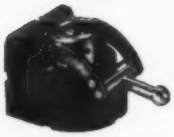
Holding-indexing fixture

Holding fixture


Vertical-horizontal fixture

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CIRCLE INFORM-A-GRAM KEY NO. 86

A Time-Saving Photo-Drawing Technique, Photoneering, is described in a bulletin which explains how a special heat and humidity resistant plastic sheet is placed over a photo to permit quick marking of specification changes. Get a copy of the bulletin from Technical Reproduction Service, 375 South St., Newark 5, N. J., or— **Circle F3**

A Compact Reproduction Machine which makes enlargements of micro-filmed drawings and records, has been announced by Charles Bruning Co., Inc., 1800 W. Central Rd., Mt. Prospect, Ill. The Copytron Model 1000 Enlarger-printer enlarges 35mm microfilm 14 to 16 times and prints standard size enlargements. Get more information from the company, or — **No. F4**

Hazards of Epoxy Dermatitis are cited and 36 specific rules for prevention are listed in a 12-page booklet. Sections include education of workers and supervisors, company housekeeping procedures, ventilation, personal cleanliness of workers, and use of protective creams and clothing. Write to Milburn Co., 3246 E. Woodbridge, Detroit 7, for your copy, or — **Circle F5**

For Planning and Layout use Panoramics presented in a bulletin from Panoramics, 631 E. 1st St., Boston 27. Scaled desks, cabinets, and other furnishings, symbols, letters, and numerals save time in making graphs and planning, and they can be used over again. Write to the company for the bulletin, or — **Circle Inform-A-Gram No. F6**

"How to Save Time and Money With 'Assembly Line' Shipment Addressing" tells how to cut shipment addressing costs. The booklet shows how to reduce label preparation, speed shipments with up to 50 direct-to-carton addresses a minute, and save costs with fast machine printing and addressing of labels. This booklet is available from Weber Marking Systems, 215 E. Prospect Ave., Mt. Prospect, Ill., or — **Circle Inform-A-Gram No. F7**

An Inexpensive Filmsort Aperture Card with diazo film blank is designed to simplify and speed one-time reference or manual reproduction of one or a few copies of engineering drawings. A print of the card can be made quickly from the master so there's no misfiling or loss of the original. For information, write to The Filmsort Co., Pearl River, N. Y., or — **Circle F8**

DiaTest

HIGH PRECISION SMALL BORE GAGE

- MINIMUM BORE 1/16"
- READINGS IN .0001"
- RANGE: .057" TO .828"
- 3 SETS, fully equipped with Rings and Measuring Heads for complete range.

DiaTest measures out-of-round, tapers, incomplete bores and all other variations to .00008" accuracy.

All parts available separately.

EACH SET complete with dial indicator in walnut case.

SET No.	RANGE	MEASURING HEADS	SETTING RINGS
E-1	.057"-.170"	8	8
E-2	.165"-.390"	9	9
E-3	.372"-.828"	9	9

NEW ACCESSORIES AVAILABLE

- RIGHT ANGLE ATTACHMENT — permits gaging without removing work-piece from under bore spindle.
- EXTENSION RODS—may be used to length of 30" without loss of accuracy.
- DEPTH ADJUSTER—used in conjunction with extension rods, permits readings to any defined depth.

FOSTER SUPPLIES CO.

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GRINDS METAL SAWS

in Gangs AUTOMATICALLY

57T

WARDWELL's 57T Cuts Costs—makes money for you. Will sharpen as many as 250 Milling Cutters, Slitting and Screw Slitting Saws .015" thick at one time with a variation, plus or minus .001" of exact diameter for entire lot. Automatically indexes the gang of saws, one row of teeth at a time. Grinds either wet or dry.

A Time and Money Saver

Write for Bulletin 57T

WARDWELL
3809 Ridge Road
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Maker of Largest Line of Saw and Tool Sharpening Machines

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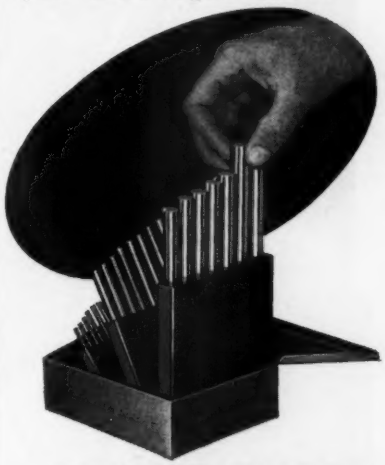
Now available in 182 standard sizes to meet your exact requirements



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hardened high speed steel DRILL BLANKS

These versatile, low-cost drill blanks are made of top quality, uniformly hardened high speed steel precision ground to exacting tolerances to meet the requirements of countless applications. Ideal for use as dowels, punches, knockout pins, gages, and rollers. Readily adaptable to form a wide variety of end cutting tools, too. And they're offered now in 182 standard stock sizes and in sets as shown.

Call your local Ace Drill Distributor today!

NEW CATALOG covers the entire line of Ace "Ground-from-the-Solid" High Speed Steel and Carbide Drills, Reamers, Drill Blanks and Special Drills. Send for it today!

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ADRIAN, MICHIGAN

ORIGINATORS OF "GROUND-FROM-THE-SOLID" DRILLS

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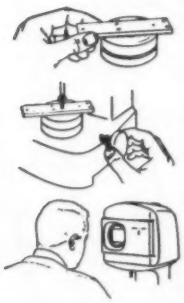
New! BAUSCH & LOMB DR-25 OPTICAL GAGE

Direct scale reading to .0001" ...

0" to 3" range ... accurate to .000025"!

FAST, EASY AS A-B-C!



A Just set part to be measured on anvil ... no masters or set gages needed. Large work table makes it easy to adapt special fixtures, accommodates widest variety of work.

B Turn knob to lower spindle ... it will stop automatically on contact, with constant spindle pressure.

C See precise measurement at a glance ... direct-reading scale is illuminated, magnified. No eyestrain, no conversion, no guesswork. Dependable measurement of depth, thickness, height, diameter, taper, angularity of surfaces, runout.

ONLY $695 COMPLETE

On-the-job demonstration! JUST MAIL THE COUPON TODAY!

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79835 St. Paul St., Rochester 2, N. Y.

☐ I'd like a free on-the-job demonstration of the new B&L DR-25 Optical Gage, with no obligation on my part.

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BAUSCH & LOMB SINCE 1853

CIRCLE INFORM-A-GRAM KEY NO. 88

Management

Provide Taped Voice Instructions to workers, rather than printed works or diagrams, with the new Dictaphone AIMO system. One machine records and another reproduces spaced instructions for the operator who performs manufacturing processes by steps. This system increases productivity and cuts worker fatigue. Dictaphone Corp., 420 Lexington Ave., New York 16, or — **Circle Inform-A-Gram No. F10**

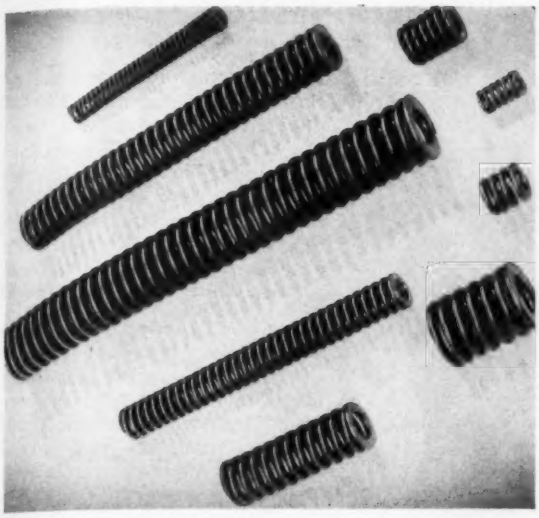
"The Truth About Office Copying Machines" is a factual guide to help select office copying machines. The booklet points out advantages and disadvantages of various types and discusses comparative speed, ease of operation, and limitations of the processes. Copease Corp., 425 Park Ave., New York, supplies copies of the booklet, or — **Circle F11**

A High Speed Punched Card Reader, Speedreader 2000, reads conventional punched cards now by row, 80 columns wide, at the rate of 2000 cards/min. It also has a capacity in the feed and stacking hoppers for 4000 conventional punched cards. For details, write Philco Corp., Industrial Div'n, Philadelphia, or — **Circle Inform-A-Gram No. F11**

"Planning for Flexible Automation" discusses five steps on how to use numerically-controlled machines for economic production of job-lot orders and prototype development. Use the included checklist to find out whether or not automation is needed for a particular operation. Case histories show reductions in production time and costs and increases in accuracy and machine flexibility by using numerical controls. Write to General Electric Co., Schenectady 5, for your copy of Bulletin GED-3684, or — **Circle Inform-A-Gram No. F12**

Magnetic Tape for instrumentation use is discussed in a catalog which explains especially the various types and uses of the tape. Physical and magnetic properties of the tape and a comparison chart summary of the major factors are given. Get your copy from Magnetic Products Div'n, Minnesota Mining and Mfg. Co., St. Paul 6, or — **Circle F13**

BUY U.S. SAVINGS BONDS TODAY!



Die Springs

Chrome vanadium die springs in stock in a wide variety of hole and rod sizes, lengths and deflections. Medium, medium-heavy, heavy duty for increased life and reduced down time. Write for list of specifications and prices, and name of nearest distributor.

Raymond Manufacturing Division
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5937

CIRCLE INFORM-A-GRAM KEY NO. 891

THIS HAND IS IN THE CHIPS! Yes, and the chips are not in your eyes or hair or ways of machines. The Heimann Magnetic Chip Remover gets chips out of blind holes rapidly, cleanly, safely. It's a lastingly efficient permanent magnet in a knurled aluminum holder. Send it in after chips and it comes out covered with them.

YOU CAN'T AFFORD to be without it! A natural for your tool box or crib. Made ⅛" to ½" sizes, at a price to attract. Write now for circular.

Permanent — Easier
Strong — Convenient
Quicker — Better

HEIMANN MFG. CO., URBANA, OHIO

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SPELLMACO SPOTTERS

A matched set of transfer punches for toolmakers, machinists and tool cribs.

Used for transferring location of threaded, drilled and reamed holes, slugs, blanks, etc.

Precision made of finest tool steel carefully heat treated and tempered for long life. .0025 undersize to facilitate use—black oxide finish.

Set No. 3-17: 28 punches with indexed stand—sizes 3/32" to ½" by 1/64" plus hand 17/32" size—length 4⅞". PRICE only $17.90

Single size available.

R. L. SPELLMAN CO. • Urbana, Ohio

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HOLES JIG GROUND with *Vulcanaire*

Provide yourself with this inexpensive* instrument for use on your present equipment and JIG GRIND with a guarantee.

A five station indexing fixture from Vulcan's Contract Tool Room (Your tool room in Dayton).

Using a jig borer index table with the Vulcanaire 5 indexing holes and 35 locating and clamping holes were JIG GROUND in place. Result — eliminated all close locating and dowelling of individual parts and of course hours of time.

*Vulcanaire equipment pays for itself on the first job.

{ Borrow our instructive 11 minute movie on Jig Grinding. }

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VULCAN tools

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SHOW STOPPER

It's the new Torrington Verti-Slide, the first major innovation in the field of VERTICAL 4-SLIDE equipment in 50 years!

This machine was designed to meet a growing need for greater productivity and profitability in the cost-critical area of wire and strip forming.

Seldom before has a new machine created such immediate and widespread interest. We urge you to get the full story. Write or call today.

THE TORRINGTON MANUFACTURING COMPANY

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CIRCLE INFORM-A-GRAM KEY NO. 90

Plastics

PRODUCTS & PROCESSES & PRODUCTS

Hysol Tooling Materials are described in a new technical data bulletin which gives information on gel or surface coating compounds, laminating compounds, and casting and high temperature compounds, in easy-to-read tabular form. Get Bulletin T1A from Tooling Div'n, Houghton Laboratories, Inc., Olean, N. Y., or — **Circle E1**

Chem-o-sol Coating and Molding Compounds, are described in a catalog which gives various application methods and end uses for the compounds. Included is technical data on stock formulations and descriptions of case histories from users of this specially formulated high molecular weight polyvinyl dispersion. For more information, write to Chemical Products Corp., King Philip Rd., E. Providence 14, or — **Circle Inform-A-Gram No. E2**

Versatile Synthetic Fiber Reinforcing Mats now have improved outdoor weathering qualities, electrical insulating properties, and resistance to abrasion. Chemical resistance and motor housings and aircraft parts are some of the things which can be used with these overlays and without the use of gel coats. The Felters Co., 210 South St., Boston 11, or — **Circle E3**

A High-Impact Modified Acrylic Resin, Implex A, is available in extruded sheets for applications in jigs and fixtures, machine parts, and other parts exposed to continuous or intermittent contact with water. The sheets contain no plasticizer and have excellent dimentional stability. Cadillac Plastic and Chemical Co., 15111 2nd Ave., Detroit 3, or — **Circle Inform-A-Gram No. E4**

Nested Plastic Mold and Die Cast Bases are listed in a catalog published by Columbia Engineering Co., Inc., 113-119 Sussex Ave., Newark 3, N. J. Dimensions are given in chart form and diagrams show construction features. Get a copy of this catalog from the company, or — **E5**

"Epoxy Resins — Applications and Advantages" is a guide to resin selection and contains information on resin properties and uses. A section also explains how and when casting and laminating are employed as methods of constructing jigs, fixtures, gages, models, and dies. This bulletin is available from Marblette Corp., 37-31 13th St., Long Island City 1, N. Y., or — **No. E6**

How to breathe new life into your old presses . . .

Modernize! Replace the old, outdated features on your presses with brand new factory-engineered assemblies. New clutches, new slide adjustments, new bearings—these are only three of the 42 Bliss modernization assemblies you can add right in your own plant, keeping downtime and outside costs to a minimum. You can add important new press features to your old press at a fraction of the cost of a new press!

When modernizing won't do the job . . . consider *rebuilding*. We've rebuilt presses 20 years old and older—*restored them to their original efficiency!* We replace and refit all wearing surfaces . . . replace worn and outdated parts . . . put your press back together to its original tolerances. And we *guarantee* it.

Which is better—to rebuild or modernize? It depends upon the press and what you want it to do. Your local Bliss man will be glad to give you the facts.

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BLISS is more than a name . . . it's a guarantee

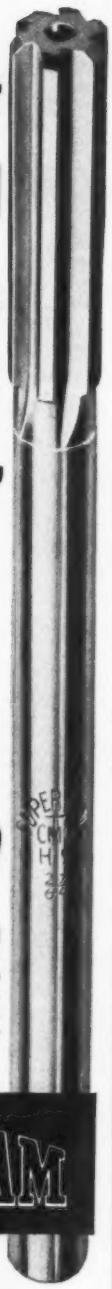
PRESSES • ROLLING MILLS • ROLLS • DIE SETS • CAN MACHINERY • CONTRACT MFG.

CIRCLE INFORM-A-GRAM KEY NO. 91

What other tool companies consider "SPECIALS"

(IN DECIMAL SIZES)

... WE STOCK AS STANDARD



Thousands of chucking and Stub Reamers by the .001 in Stock ready for the precise job. Why buy or make "SPECIALS" when you can BUY from STOCK — over night.

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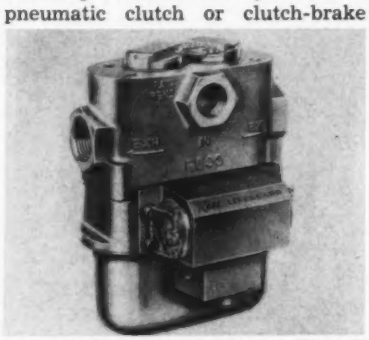
CIRCLE INFORM-A-GRAM KEY NO. 921

Products & Processes

PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS

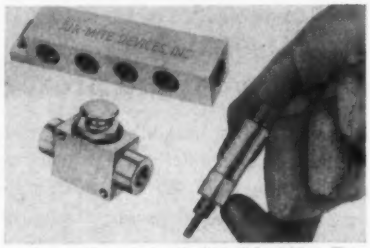
This Valve senses any potential malfunction within itself and locks out to prevent unsafe operation of pneumatic clutch or clutch-brake



controlled power presses. The C version Lifeguard three-way valve can be re-cocked pneumatically or manually, allowing maximum flexibility in location of the valve. Ross Operating Valve Co., Detroit, or — **Circle Inform-A-Gram No. A1**

"Marking Tools" contains detailed information on hand stamps, code stamps, lettering dies, knurls, and knurl holders. Specifications and illustrations are included for each item. Tips on how to order are also given. Geo. T. Schmidt, Inc., 4112 Ravenswood Ave., Chicago 13, publishes the catalog, or — **Circle A2**

For Trouble-Free, high-cycle opening, closing, holding, ejecting, marking, and centering operations in close quarters, use a line of miniaturized air cylinders, valves, and fittings



such as those made by Air-Mite Devices, Inc. They have standard ⅛-27 taper pipe threads. Air-Mite Devices, Inc., 4401 W. Kinzie St., Chicago, or — **Circle A3**

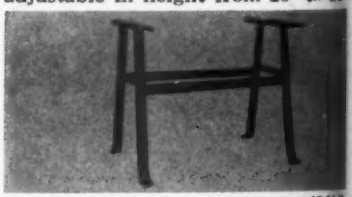
Cold Finished Bars are listed in chart form in a revised bulletin from Joseph T. Ryerson & Son, Inc., Box 800-A, Chicago 80. It's a simplified guide of 23 types of cold finished carbon steel bar. Mechanical properties, machinability, shapes, and size range are included. Get Bulletin 12-5 from the company, or — **Circle A4**

A High-Temperature Material, silicon nitride, which operates up to and over 3000°F in certain atmospheres, is described in a bulletin. Presented is information on properties, design features, and applications. This bulletin is available from Haynes Stellite Co., Div'n of Union Carbide Corp., Kokomo, Ind., or — **Circle Inform-A-Gram No. A5**

A 32-Page Basic Switch Catalog includes information on the high-precision roller lever switch, the adjustable actuator switch, pulse switch, and coin switch. Details of

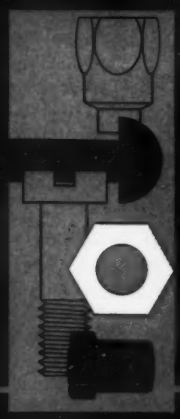
over 200 catalog listings of basic switches and related devices are covered. For a copy of Catalog 62C, write Micro Switch, Div'n of Minneapolis-Honeywell Regulator Co., Freeport, Ill., or — **Circle A6**

Flexible Design enables this adjustable utility bench to be used as a workbench, loading table, assembly line table, or storage table. It's adjustable in height from 26" to 35"



and in length from 25¾" to 43¾". For details, write Morrison Products, Inc., 16820 Waterloo Rd., Cleveland 10, or — **Circle A7**

"Adjustable Storage Racks, for Every Storage Purpose" shows how to store all types of materials on these racks. It also tells how the racks are assembled easily without bolting or welding. Get the bulletin from Palmer-Shile Co., 16039 Fullerton, Detroit 27, or — **Circle A8**



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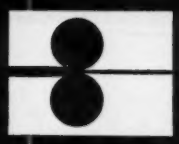
Cold Headers • Parts Formers • Nut Formers • Slotters • Threaders • Pointers • Trimmers and other Cold and Hot Forming Equipment



ROLLING MILL MACHINERY

Two-High and Four-High Mills • Special Mills • Sendzimir Mills • Rod Mills • Slitters • Coilers • Winders • Straighteners • Payoffs • Edgers • Coil Boxes • And Other Mill Equipment

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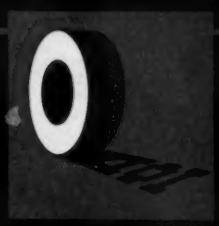
FOUNDED 1851



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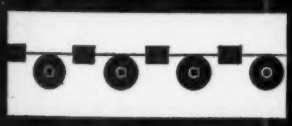
Continuous Tandem And Upright Cone Wire Drawing Machines • Bull Blocks • Wire Flattening Mills •



Swagers • Roll Pointing Machines • Spoolers • And Other Wire Equipment

POWER PRESSES

Cam and Crank Eyelet Machines • Horizontal Redraw Presses • Multiple Plunger Pillar Presses • High Speed Blanking Presses • Collapsible Tube Equipment • Ammunition Machinery, etc.

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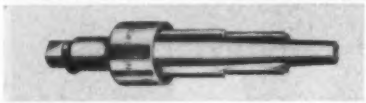
DIVISION OF TEXTRON INC.
Waterbury, Connecticut • U.S.A.
Sales Offices: Chicago • Cleveland • Los Angeles • Millburn, N. J.

CIRCLE INFORM-A-GRAM KEY NO. 93

Products & Processes

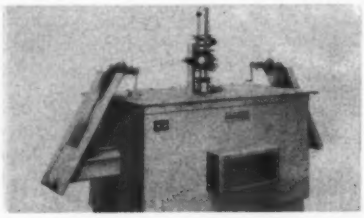
PRODUCTS & PROCESSES & PRODUCTS

New Universal Step-Jaw Expanding Mandrels are introduced by LeCount Tool Works, Inc., W. Hartford, Conn. Ideal for smaller shops



and for maintenance and repairs in larger concerns, these nine G Type mandrels provide a ⅜" to 7" expansion range. Get information from the company, or — **Circle No. A9**

Infinite Temperature Control and a safeguard against overloading the elements are provided by the reactor-transformer control system on the new Hevi-Duty molybdenum tube furnaces. They'll operate up to



3000°F and are available in standard single-end or double-end furnaces. Hevi-Duty Electric Co., Milwaukee 1, or — **Circle A10**

Hydraulic Die Casting Machines are highlighted in a new general bulletin which gives detailed descriptions and specifications for machines that have locking pressures ranging from 50 to 1000 tons. The Cleveland Automatic Machine Co., Cincinnati 12, supplies copies of the bulletin, or — **Circle A11**

Industrial Television is highlighted in a bulletin. Suggestions for equipment of selection, examples of applications, and explanations of the different types of equipment, are included. Diamond Power Specialty Corp., Electronics Div'n, Box 415, Lancaster, Ohio, supplies copies of Bulletin 2239, or — **Circle No. A12**

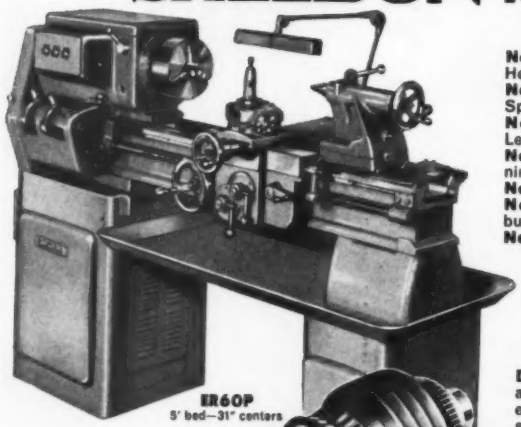
"Facts About Anchoring Your Machines with Unisorb" vibration mounts covers all types of general machinery and includes examples, case histories, cost reduction results, vibration studies, and deflection curves. Get your bulletin from Dept. WCH, The Felters Co., 210 South St., Boston 11, or — **Circle Inform-A-Gram No. A13**

Precision Tooling and machining facilities offered by Lenkeit Machine & Tool Co., Inc., 24 Allen Blvd., Farmingdale, L. I., N. Y., are discussed in a brochure. Descriptions of their electrical discharge machines, profile grinders, and jig boring and grinding machines, are included. Get this brochure from the company, or — **Circle No. A14**

"Important Cost-Control Opportunities Hinge on the Way You Manage Lubrication" is one of the sections in the booklet, "Management Practices the Control Costs via Organized Lubrication." It also discusses who is responsible for lubrication and how to determine savings. Get your copy from The Texas Co., 135 E. 42nd St., New York 17, or — **Circle Inform-A-Gram No. A15**

Seamless and electric-resistance welded steel tubing in mechanical, aircraft mechanical, airframe, and pressure grades is described in an 8-page catalog. Information on fabricated and forged steel tubing, special shapes, tolerances, and size ranges is also presented. Request Catalog CS-59 from Ohio Seamless Tube Div'n, Copperweld Steel Co., Shelby, Ohio, or — **Circle No. A16**

Both NEW and DIFFERENT SHELDON 15" PRECISION LATHES



ER60P
5' bed—31" centers

NEW

New. Revolutionary double-box Headstock (Pat. Pend.)
New. "WORK-HOLDING ONLY" Spindle.
New. Single-Shift Back Gear Lever on Headstock.
New. Headstock and Apron running in oil.
New. 1¼" Hole through Spindle.
New. 60-pitch Gear Box with built-in Lead Screw Reverse.
New. Amazing LOW PRICE.

DIFFERENT

Different. Spindle rigidly held in two large "Zero Precision tapered roller bearings arranged in box-type design.
Different. Electrical switches and push-button stations fully enclosed in built-in well in headstock.
Different. Two independent clutches in apron for selecting power feeds.
Different. Cam-action tailstock clamp for rapid release and instant locking of tailstock.
Different. Triple, cogged, V-belt outboard drive—eliminates intermediate shafts—delivers more power to spindle.

$2350.00 base price F.O.B. Factory (Less Electricals)

This is an all new lathe that bridges the gap between conventional belt driven and geared head lathes. It combines the capacity and power of a geared head with the economy and flexibility of a belt driven lathe. Available with 5', 6' and 8' bed lengths providing 31", 42" and 66" center distances.

Send in Coupon for full Information ↓

SHELDON MACHINE CO., INC., 4235 No. Knox Ave., Chicago 41, U.S.A.

Gentlemen: Please send me information on items checked.

( ) The NEW and DIFFERENT SHELDON 15" Lathes
( ) Sheldon ( ) 10", ( ) 11"
( ) 13" Lathes
( ) 11" and 13" Variable Speed Lathes
( ) High Speed Turret Lathes
( ) Sebastian 13" and 15' Geared Head Lathes
( ) Horizontal Milling Machine
( ) Sheldon 12" Shaper
( ) Name of Local Dealer
( ) Have representative Call

Name_____ Title_____
Company Name_____ ☐ Company
Street Address_____ ☐ Home
City_____ State_____

CIRCLE INFORM-A-GRAM KEY NO. 94

NEW! ULTRA-MODERN 45-TON OBI

added to Niagara's exclusive front-to-back crankshaft series

READY FOR YOU

. . . a brand new addition to industry's most advanced line of OBI's! Years ahead of any press within its range, this 45-ton newcomer is available plain or geared. The front-to-back arrangement of its 3½" crankshaft is, of course, a distinguishing mark of Niagara's famous Series E.

No other OBI press design has been so widely acclaimed. And no wonder . . . for no other OBI boasts so many unique advantages:

Full support to wide dies. Greater resistance to off-center loading. Accurate alignment of slide with minimized tendency to cock. Crankshaft deflection minimized. Substantially increased die life. Smoother, safer performance. Exposed overhanging gears, flywheel and other mechanisms eliminated. Less floor space.

GET THE FULL STORY on this new 45-ton wonder-worker as well as the 4 other sizes in the Series E family (up thru 200-ton capacities, and 7½" shaft diameters, standard and automated models). Write for illustrated Bulletin 56.

NIAGARA MACHINE & TOOL WORKS, BUFFALO 11, N. Y.

- Rigid crankshaft with close coupled main bearings each side of crank pin.
- Widest spaced OBI gibbing (L to R) in the industry permits wider box section slide to rigidly support a greater slide face area of full JIC dimensions. Guiding of slide is closer to point of die operation because there is no flange interference with gibbing.
- Longest gibbing in the industry, exclusive multiple "V" type, provides the most efficient guiding and accurate alignment of slide for greatest die life.
- Fully concealed, yet readily accessible, driving mechanism.
- Enclosed, rigidly supported gearing operates in sealed oil bath.
- Low inertia, pneumatic friction clutch and brake operate directly on crankshaft — the slowest rotating shaft.
- Precision, hardened, longer-wearing steel gears.
- Rigid, compact all-steel, box type frame.
- Power slide adjustment and power inclining device operate with new, unequaled speed.

NIAGARA

OBI PRESSES SERIES E

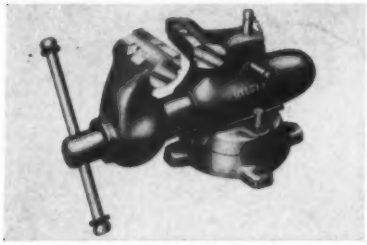
DISTRICT OFFICES: Boston • Buffalo • Cleveland • Detroit • Indianapolis • New York • Philadelphia / Distributors in principal U.S. cities and major foreign countries.

CIRCLE INFORM-A-GRAM KEY NO. 95

Products & Processes

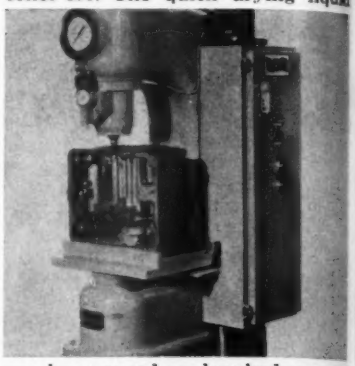
PRODUCTS & PROCESSES & PRODUCTS

Clamp Irregular or Tapered Workpieces with the new swivel jaw vise developed by Wilton Tool Mfg. Co., Inc., Schiller Park, Ill. A pin holds it in place for straight clamping action, but when pin is removed, the jaw pivots right or left to lock angular workpieces in place. Get information from the company, or — **Circle Inform-A-Gram No. A17**



"The Eight Steps to Risk-Proof Alloy Steels" explains how an 8-point plan removes uncertainties as to what mechanical properties are in the alloy steel and reduces need for users to check and test these steels. Get your booklet from Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago 80, or— **Circle A18**

Protect Electrical and precision mechanical equipment against moisture, corrosion, and fungus with Alconol-400. The quick drying liquid



can be sprayed or brushed on and is stable to 600°F. The Al-Con Chemical Co., Box 8168, New Orleans 22, or— **Circle Inform-A-Gram No. A19**

Precise, Adjustable Machine Speeds from in-plant a-c circuits are possible with the Reliance V-S drives, described in a bulletin. It discusses operations and applications, and functions of the drive components. Reliance Electric and Engineering Co., 2471 Euclid Ave., Cleveland 17, supplies Bulletin D02506, or — **Circle Inform-A-Gram No. A20**

Nylon Bearings are explained in a bulletin which gives the advantages of Nylon as a bearing material, and the operating principles, installation recommendations, and available sizes of these bearings. Obtain this bulletin from Thompson Industries, Inc., Manhasset, N. Y., or — **Circle Inform-A-Gram No. A21**

"Shaft-Mounted Speed Reducers" is a bulletin which tells how to simplify your speed reduction jobs. Features, applications, dimensions, and diagram drawings of a number of the models are given. Book 2618 is published by Link-Belt Co., Dept. PR, Prudential Plaza, Chicago 1, or — **Circle A22**

"Controlled Atmospheric Conditions" gives specifications for environmental chambers and technical information on metal shrinkage, low temperature refrigerants, and environmental applications. Contact Webber Engineering Mfg. Co., Inc., P. O. Box 217, Indianapolis 6, or — **Circle Inform-A-Gram No. A23**

Cut Heat Transfer Costs using Platecoil instead of pipe coil. A bulletin solves different problems and gives specifications of several styles in chart form. Write Platecoil Div'n, Tranter Mfg., Inc., Lansing 9, Mich., for copies of Bulletin IP-356, or — **Circle No. A24**

New accomplishment in automation with new Logamatic 410

automated turret lathe with air-hydraulic cross slides

Only the Logan Logamatic 410 offers so many features in its price range! Swing over bed, 14⅜". Swing over cross slide, 6⅛". Spindle bearings: (4) ABEC Class 7. Speed range, 25 to 2,000 rpm. Two-speed, 3—1½ hp. Dinabrake motor and controls are standard equipment.

$8,800.00*

*F.O.B. factory, including motor and controls complete, less 8" power chuck accessory. Price subject to change.

- Electric power-turret feed
- Automatic cycling
- Adjustable rapid travel
- Variable-rate turret feed
- Variable-rate cross slide feed
- Variable-speed drive
- Pushbutton control
- Available as bar-feed machine
- L 0 spindle nose

LOGAN ENGINEERING CO. Dept. M-1158, 4901 Lawrence Avenue, Chicago 30, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 96

"It's so easy to use!"

SEMI-SKILLED WORKERS GAGE PRECISION HOLES WITH POSITIVE ACCURACY USING

For holes ⅛" to 10" diameter.

COMTORPLUG with interchangeable expanding plugs to gage simple or special bores from ⅛" to 10" diameter.

Can be put into use without elaborate get-ready because no electronics, no air base, no training program:

1. Automatic 2-point gaging —
   a. Self-centering and aligning.
   b. Uniform gaging feel regardless of who uses it.
2. Reads actual hole size.
3. Fixed – not passing – reading.
4. Detects tapers and other irregularities.
5. Positive indication within .0001".

PLUS —

TREMENDOUS ECONOMY

SEND FOR BULLETIN 50 →

COMTOR CO., 82 FARWELL ST., WALTHAM 54, MASS.

COMTORPLUG

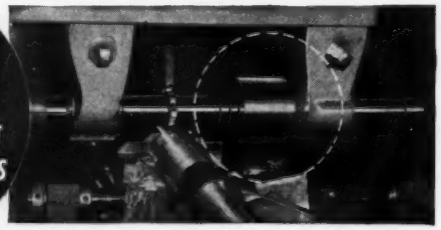
COMTORPLUG USERS INCLUDE

Airesearch Mfg. Co.	Hamilton Standard Division
Allison Div.	Harris Seybold Co.
Apex Electrical Mfg.	Homelite Corp.
Buick Motor Div.	Int. Harvester Co.
Century Electric Co.	Jacobs Mfg. Co.
Chicago Pneu. Tool	Lycoming-Spencer Div.
Chrysler Corp.	McDonnell Aircraft
Continental Motors	National Lead
Curtiss-Wright	Northrop Aircraft
Detroit Transmission	Pontiac Motor Div.
Douglas Aircraft	Scintilla Magneto
Fairchild Engine & Airplane Co.	Steel Products Eng.
Falk Corp.	Studebaker-Packard
Ford Motor Co.	Sylvania (Atomic Div.)
General Electric Co.	United Airlines
Warner Gear Div.	

CIRCLE INFORM-A-GRAM KEY NO. 971

ELIMINATE MILLING MACHINE MAINTENANCE

OF ARBOR OUTER SUPPORT BUSHINGS



OFTEN UPS SPEEDS AND FEEDS 200%

Sound too good to be true? Then see how General Electric, Jeffrey Mfg., hundreds of others absolutely end arbor bushing maintenance problems and decrease production costs on horizontal milling machines by replacing the bronze outer support bushing with a Jergens "Live" Sealed Roller Bearing Unit as illustrated above. Jergens Units with adjustable roller bearings hold precision—permit increases in milling speeds and feeds to take full advantage of carbide cutters. The rigidity of these units increase cutter life and eliminate chatter, frozen bushings, and twisted arbors.

SEE HOW HUNDREDS SAVE THOUSANDS!

WRITE FOR FREE CASE HISTORIES OF ACTUAL company performance reports of jobs and dollars saved!

DONLEY PRODUCTS, INC.

Dept. TP-11, 11106 Avon Ave. • Cleveland 5, Ohio

CIRCLE INFORM-A-GRAM KEY NO. 972

One hand moves it EASILY!

THE WELLS MODEL 49A

"2 in 1" METAL CUTTING BAND SAW WITH WHEELS AND HANDLE

(Optional Equipment)

With heavy duty, rubber tired, ball bearing wheels and one piece fold-down handle, the Wells Model 49A is a metal cutting band saw that's REALLY MOBILE . . . and VERSATILE. Use the 49A as a horizontal cut-off machine (capacity 3½" x 6") or swing the head to vertical position . . . it's an upright band saw.

The optional wheel and handle unit, available for new machines and those already in service, is a tremendous time and labor saver. Ask your local Wells Distributor for details . . . or write for Bulletin 253-H.

Wells

The Pioneers of Horizontal METAL CUTTING BAND SAWS

WELLS MANUFACTURING CORPORATION

1940 Cedar St., Three Rivers, Mich.

CIRCLE INFORM-A-GRAM KEY NO. 973

HANDBOOK OF LAYOUT AND DIMENSIONING FOR PRODUCTION

by HYMAN H. KATZ

479 PAGES, PROFUSELY ILLUSTRATED

A few of the many features:

- A scientific breakdown of dimensioning and tolerancing that clarifies practical problems
- Systematically presented "know-how" for draftsmen and designers
- Interpretation of the new ASA standards for dimensioning and tolerancing
- A complete chapter on the all-important subject of gaging
- The functional principles of dimensioning
- A step-by-step presentation in clear, interesting and succint English

$15.00

HUEBNER PUBLICATIONS, INC.
P. O. BOX 3505, 1975 LEE ROAD, CLEVELAND 18, OHIO

Please send _____ copies of "HANDBOOK OF LAYOUT AND DIMENSIONING FOR PRODUCTION" at $15.00 each postpaid. (Ten day examination allowed; returnable for full credit or refund if returned in saleable condition.)

COMPANY _____

BY _____ TITLE _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

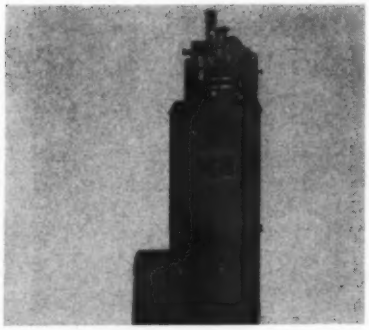
Open account shipments to rated companies. Otherwise, payment with order, please. No C.O.D.'s. Ohio customers add 3% sales tax.

Products & Processes

PODUCTS & PROCESSES & PRODCUTS

No Special Equipment or arbors are needed to produce a wide variety of springs on this automatic spring coiler. It handles any shape 0.005" to 0.040" wire. Write Perkins Machine & Gear Co., Special Machinery Div'n, W. Springfield, Mass., for information, or —

Circle Inform-A-Gram No. A25



In Close Quarters use the ½" square drive ratchet handle and socket sets described in a bulletin. Specifications and a description of types of sets available are listed in easy-to-read chart form. Get your copy from Lowell Wrench Co., 54 Commercial St., Worcester 8, Mass., or — **Circle Inform-A-Gram No. A26**

Select the Self-Locking Set Screw best for a particular job, using the chart published by Set Screw & Mfg. Co., Bartlett, Ill. The chart lists the types of screws available, types of sub-assembly material in which they can be used, and the drives, points, and tapped hole sizes available. Write to the company, for your chart, or — **Circle A27**

For Accurate High-Production Brinnel Hardness Testing, use this new machine that determines the workpiece position before it can operate and indicates relative hardness of the part by colored lights. The machine also detects difference in diameter of impression. Steel City Testing Machines, Inc., 8817 Lyndon Ave., Detroit 38, or — **No. A28**

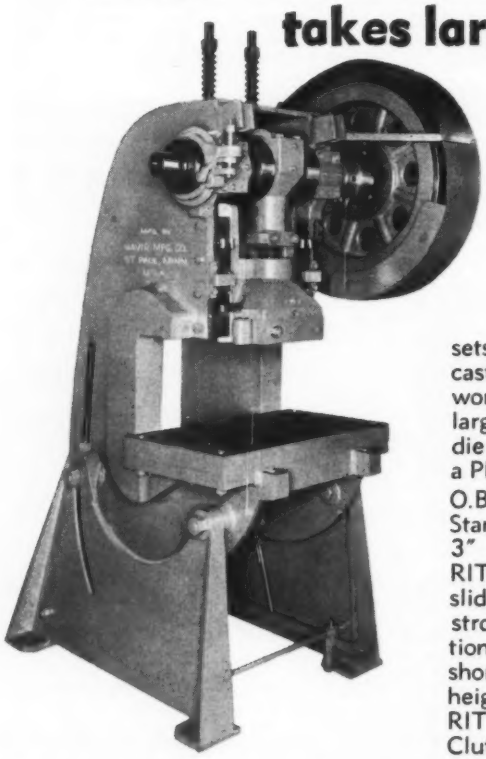
A Comparison Chart lists 43 types of carbon, alloy, and high speed tool steel produced by Vulcan-Kidd Steel Div'n of H. K. Porter Co., Inc., Aliquippa, Pa. It covers the main categories of tool steel including hot work, tool and die, shock and special purpose types, and carbon and carbon vanadium. Get a copy from the company, or — **Circle No. A29**

A Data Sheet describes content, properties, and typical applications of a hard-surfacing material, tungsten carbide Spray-weld powder. Base metal and overlay thickness recommendations are included. Data Sheet 21 is prepared by Wall Colmonoy Corp., 19345 John R. St., Detroit 3, or — **Circle A30**

A 50-Page Bulletin covers the complete line of cemented carbide products manufactured by Kennametal, Inc. Tables of specifications and design drawings are given for boring tools, clamped tool inserts, and standard blanks. Write to Kennametal Inc., Dept. 59, Latrobe, Pa., for a copy of Catalog 59, or — **A31**

A Nickel-Chromium-Iron Composition, Hoskins Alloy 502, described in an engineering bulletin, is used in mechanical applications needing high resistance to heat and corrosion. Tabulations of the physical and mechanical properties and standard stock sizes are given in the bulletin from Hoskins Mfg. Co., 4445 Lawton Ave., Detroit 8, or — **Circle No. A32**

NEW... 40 Ton Press-Rite Press with all steel frame takes larger die sets.



All steel frame is heavily reinforced at all vital points for maximum rigidity. Generous ram area, large bed area and depth of throat allows use of larger die sets. Many jobs, such as die cast trimming, electronic work, etc., usually put on larger presses to get necessary die space can now be done on a PRESS-RITE No. 40, 40 Ton O.B.I. Press.

Standard equipment includes 3" stroke, patented PRESS-RITE automatic brake, 4 point sliding key clutch and single stroke safety mechanism. Optional features: longer or shorter stroke, greater shut height, back geared, PRESS-RITE Airflex Air Friction Clutch and others.

For complete information and specs on the NEW 40 TON PRESS-RITE PRESS see your PRESS-RITE Dealer or write for new #40 Bulletin.

PRESS-RITE Division of

SALES SERVICE MACHINE TOOL CO.

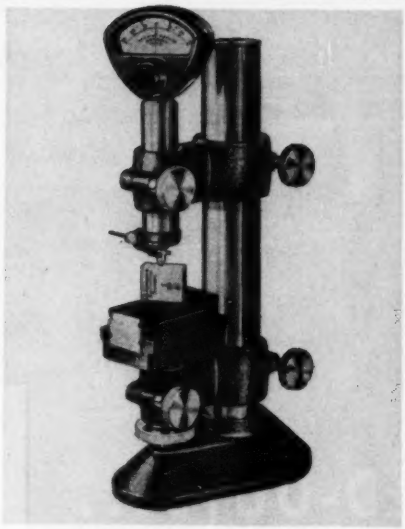
2361 University Avenue
St. Paul 14C, Minnesota

PRESS-RITE
O. B. I.
POWER PRESSES

CIRCLE INFORM-A-GRAM KEY NO. 98

JOHANSSON GAGING EQUIPMENT

Assures You Precision to the Finest Degree to Meet Your Requirements —Backed by the Name Supreme in the World of Measurement



GAGE BLOCKS

(JOHANSSON) and accessories. Short deliveries. Inspection and reconditioning service available at our plant.

INTERNAL INDICATORS

(for inside measurements .155 to 24 inches). Scale range plus or minus .001 graduated to .0001 and minus .020 graduated to .0001.

MIKROKATOR

(Amplifier—for outside measurements) Graduations .0001 to .000001 or .01M to .0002M.

OTHER JOHANSSON PRODUCTS

Micrometers, Snap Gages, Extensometers, Dynamometers, Hardness Testers, Surface Finish Indicators, Interferometers, Plugs, Rings and Special Gages.

MIKROKATORS (AMPLIFIERS)

FOR MEASUREMENT IN INCHES

Catalog Number	Scale Range Inches	Graduations Inches
510-E2	0".006	0".0001
510-E4	0".0024	0".00005
510-E5	0".0014	0".00002
510-E6	0".0008	0".00001
510-E7	0".0004	0".000005
510-E8	0".0002	0".000002
510-E9	0".00004	0".000001

Write for Literature

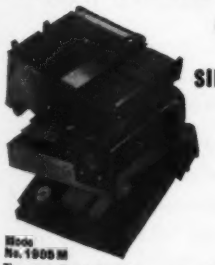
C. E. JOHANSSON GAGE CO.

A DIVISION OF SWEDISH GAGE CO.

10641 HAGGERTY AVE. • BOX 4086 NORTHEASTERN STATION • DEARBORN 1, MICH.

CIRCLE INFORM-A-GRAM KEY NO. 991

MAGNETIC SINE PLATES



COMPOUND AND SINGLE ANGLE

New Dual Field permanent Magnetic chucks with extra holding power. Positive lock on each axis.

Model No. 1905 M

The new Dual Field permanent magnetic chucks, with a center T slot, allow either side to be magnetized independently. All models are accurate to .0002" in dimensions and parallelism. A .2000" recess is provided for small angles.

Write for catalogue and prices on full line of Bald Eagle Sine Bars and Plates.

For quality—Specify Bald Eagle

Bald Eagle Corp.

(Formerly Bald Eagle Tool Co.)

356 Cedar Street • St. Paul 1, Minn.

CIRCLE INFORM-A-GRAM KEY NO. 992

NO BREAKAGE

PRODUCTO UNIVERSAL HAND TAPPER

For accurate hole-tapping without tap breakage, this Hand Tapping Machine is a "must" for every tool and die shop and toolroom. You can tap holes at any point in work within area of machine table. Quick-change spindles hold taps. Ready for instant use. Write for Bulletin TE4-102.

The Producto Machine Co.

970 Housatonic Avenue

Bridgeport 1, Connecticut

CIRCLE INFORM-A-GRAM KEY NO. 993

SPECIFY TOP QUALITY

DE-STA-CO

ARBOR SPACERS SHIMS and SPACING COLLARS • Arbor Spacers and Shims in 20 sizes and thicknesses from .001" to .125". Arbor Spacers furnished with standard keyway; Shims, with no keyway. Also Spacing Collars in numerous popular diameters, and in thicknesses from ⅛" to 3". Hardened and ground; edges chamfered. Furnished with standard keyway.

FEELER STOCK • Made from tempered stock, rolled to close tolerances, ½" x 25' coils packaged in transparent plastic boxes, except above .020". Strips ½" x 12", in cellophane. 27 thicknesses. All thicknesses from .001" to .032". (For use in precision fitting, checking clearances, inspection and production work.)

SHIM STOCK • Steel or brass. Selected from material rolled to precision limits, free from burrs, and protected by oil coating. Coils packed in carton for easy dispensing and protection. 15 thicknesses, .001" to .032". Sheets 6" x 12"; coils 6" x 120". Available also in two assortment packages —12 thicknesses, .001" to .015", and 15 thicknesses, .001" to .032".

DE-STA-CO

WRITE FOR Illustrated Brochure and Price List!

DETROIT STAMPING CO.

344 Midland Ave. Detroit 3, Mich.

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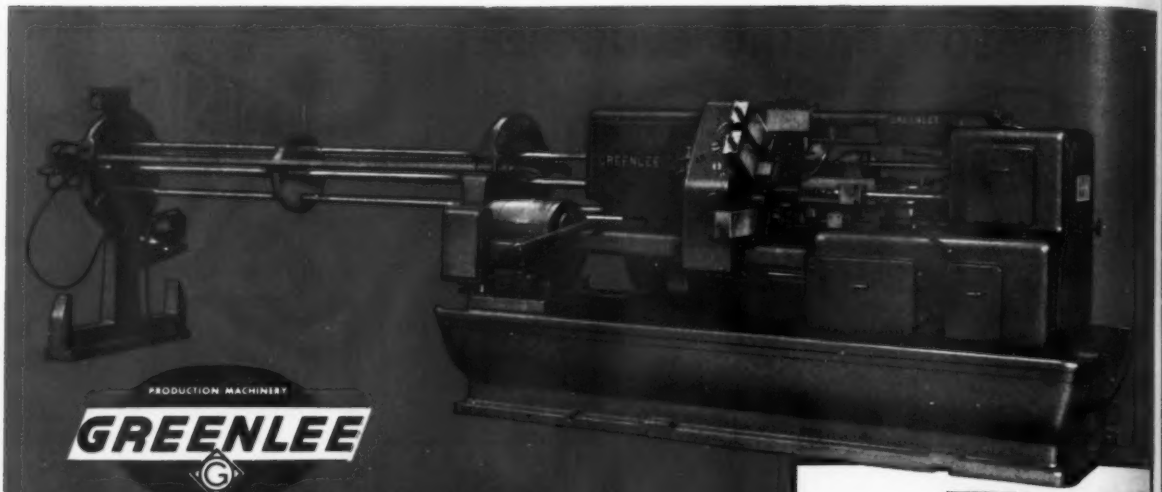


PRODUCTION MACHINERY

GREENLEE

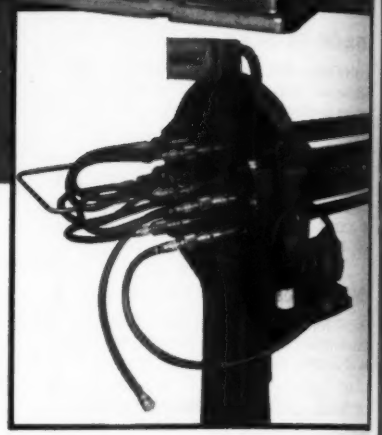
MULTIPLE FEED-OUTS...

A Natural

on Greenlee Air-Feed Automatics

Feed Out Stock to 16½"

Eliminate Pushers and Feed-Out Cams



Removable fittings attach air lines to the stock reel tubes. A vacuum pump withdraws the piston when restocking. Push-button control panel is provided for starting and stopping.

Greenlee Air-Feed Automatics offer you a 3-way profit advantage:

1. Maintenance and change-over time is reduced by eliminating stock pushers, feed tubes and feed-out cams.
2. Stock can be automatically air-fed to position in one or more machining stations permitting two or more pieces per cycle.
3. Multiple feed-out flexibility enables you to finish machine a variety of pieces that ordinarily demand costly second operation setups.

If you are running into production headaches on a specific job, Greenlee may be able to adapt an "Air-Feed" to solve your problem. See your Greenlee Distributor.

Write for your copy of Catalog A-405 — first step on the way to more profitable production with Greenlee Automatic Bar Machines.

• • •

Greenlee Standard and Special Machine Tools

Multiple-Spindle Drilling and Tapping Machines

Transfer-Type Processing Machines

Six and Four-Spindle Automatic Bar Machines

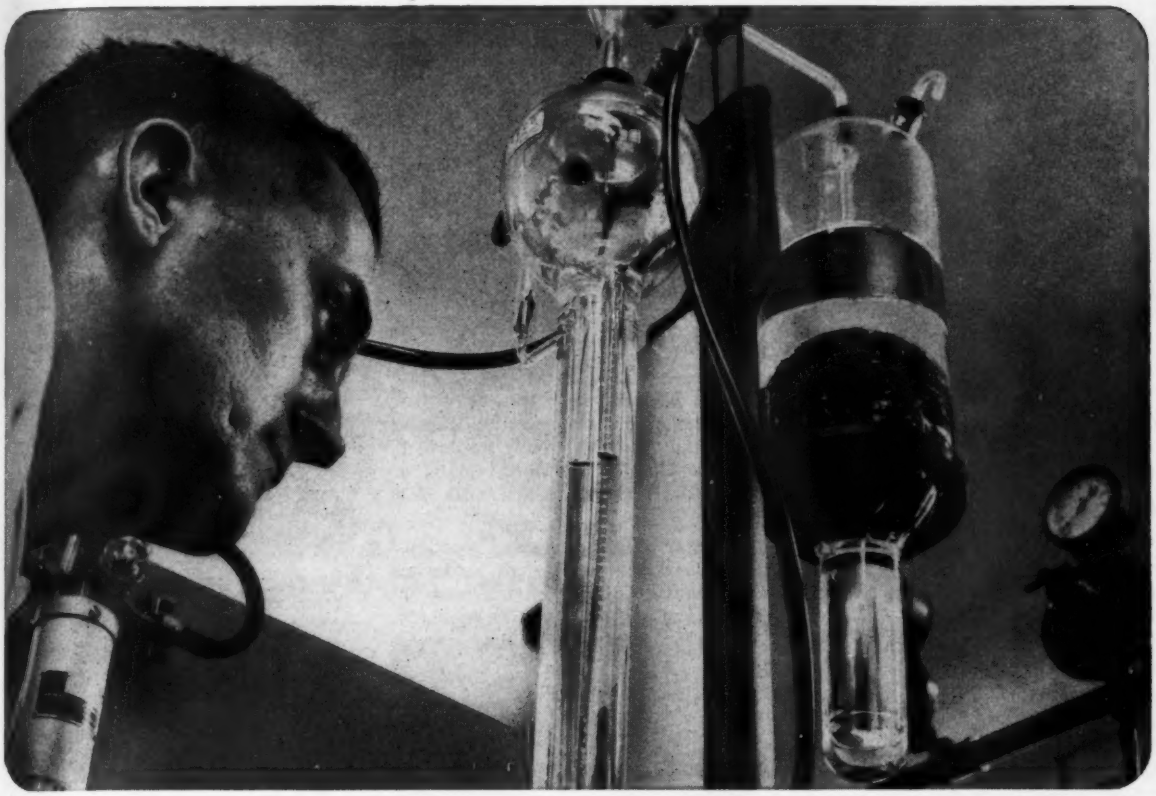
Hydro-Borer Precision Boring Machines

GREENLEE BROS. & CO.

2051 MASON AVE. ROCKFORD, ILL.

CIRCLE INFORM-A-GRAM KEY NO. 100

Experience—*the added alloy in* ***Allegheny Ludlum*** *tool steels*



QUICK, FAST TESTING for carbon content is done not once or twice but 8 times per melt in A-L's Chem Lab with this direct reading Leco carbon determinator.

Carbon content checked 8 times during melt to guarantee A-L tool steel hardenability

Lab tests for carbon eliminate your guesswork; provide high hardness, uniform hardenability, reproducible tool performance.

Because carbon has the greatest influence on hardenability, Allegheny Ludlum watches it carefully during the melt. Testing a specimen for carbon takes only a few minutes. Therefore, A-L checks for carbon content 8 times during the melt, and makes the necessary adjustments to insure accurate control of carbon. This control means Allegheny Ludlum can hold carbon content to a closer range than most customers specify.

Carbon control at Allegheny Ludlum assures you of precise response to heat treating. This control in the melt brings you predictable, *high hardness, uniform hardenability* and *reproducible tool performance.*

This is just one of the many things A-L does to insure high quality. Here are some others: close control over forging techniques, rigid temperature-time programming, careful testing of billets prior to processing to insure good surface and sound interior, control over annealing to give you the right hardness for your exact machining operation, thorough metallurgical testing to insure top tool steel quality and meeting of your specifications.

Allegheny Ludlum stocks a complete line of tool steel sizes and grades. Call your nearest A-L representative; you'll get quick service and counsel on such problems as heat treating, machining, grade selection, etc. Or write for A-L's publication list which gives full data on the more than 125 technical publications offered. They'll make your job easier.

ALLEGHENY LUDLUM STEEL CORPORATION, Oliver Bldg., Pittsburgh 22, Pa. Address Dept. TP-11

WSW-7261

ALLEGHENY LUDLUM

Tool Steel warehouse stocks throughout the country... Check the yellow pages

every grade of tool steel... every help in using it

CIRCLE INFORM-A-GRAM KEY NO. 101

Offers Many Big Advantages

- ONE-HALF THE WEIGHT
- TRI-METAL CONSTRUCTION — Aluminum — Cast Iron — Steel
- 6-SIDE UTILITY — Can Use Head-Type Bushings, on Sides, Top, Bottom
- 5 HANDLE LOCATIONS — Handle can be attached to Any Side or Bottom
- ONE HAND OPERATION — Thumb screw releases Lid Instantly
- LEAF "POP-UP" — Automatic Action Spring Plunger Snaps Lid Open
- STABLE — Rugged Construction

Standard Parts is First with Exclusive New "TUMBLE" Box Jig

New design features, new engineering concepts, new construction techniques . . . are incorporated in this outstanding line of "Tumble Box Jigs. By combining 3 metals — aluminum, cast iron, steel — half the weight has been eliminated. This increases efficiency and production. The sturdy handle (can be located on any side) makes tumbling fast, easy and safe.

Bushings can be used on all 6 sides. A unique interlocking feature is the aluminum through the cast iron legs, which assures strength and stability. Walls can easily be machined without distorting the Jig. 47 Sizes available 1" x 1" x 1" to 4" x 8" x 4". *Full size Tracing Templates are available for all 47 sizes.*

Interlocking Leg Joint

Aluminum goes all the way through the cored slots in the cast iron legs — forms a unified, interlocking joint — assuring light weight, but rugged strength.

HANDLE may easily be attached on any side or bottom of the jig as needed.

TUMBLE — Universal tumble direction is advantage of this light-weight jig — where handle can be located where desired.

Ask for TUMBLE JIG BULLETIN

STANDARD PARTS CO.

1002 BROADWAY • BEDFORD, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 102

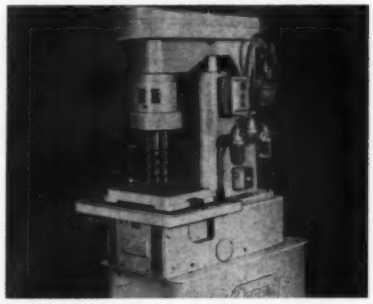
Machining

PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS

Slice Crystals with the new Nichols automatic miller, which is set up for plunge-cut slicing of Germanium into 0.013" thick wafers.

Model 8SA has a 5" dia by 0.015" thick diamond impregnated cutting disc for cutting. The Robert E. Morris Co., W. Hartford, Conn., or **Circle Inform-A-Gram No. A33**

Larger Work, heavier sections, and a wider variety of materials can now be drilled on the new 22" Zagar air oil feed drilling machine.



Thrust capacity is 2000 lbs and the controlled or slow feed ram movement is adjustable from 0 to 6". Zagar Inc., 23894 Lakeland Blvd., Cleveland 23, or — **A34**

For Precision Drilling of almost any metal, use this new standard gun drilling machine offered by Crescent Tool & Machine Co., Inc.,

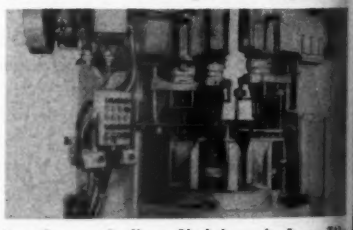
25125 W. Outer Dr., Melvindale, Mich. It handles two parts at the same time and can drill holes from 0.187" to 0.750" dia. Get information from the company, or — **A35**

The Air-Gage Tracer Contouring System is detailed in a 35-page booklet that gives comprehensive function and performance data. Different applications are pictured and

described, including precision turning, facing, and boring. For Booklet 2609, write on your company letterhead to The Monarch Machine Tool Co., Sidney 12, Ohio.

Aircraft-Quality Thread-Roll Dies now available for producing external screw threads, in both fine and coarse series are reviewed in a bulletin. The 4-page bulletin discusses design features, the reliability factor of the high-precision dies, and some of the applications possible. Standard Pressed Steel Co., Jenkintown, Pa., or — **A36**

Use This Tapping Machine for drilling, countersinking, and tapping a variety of flanged valve bodies. Model 10E-1125 is a three-head machine, with four-spindle adjustable



heads, and five-division index. It's possible for four holes to be completed in a part at one time. Kaufman Mfg. Co., Manitowoc, Wis., or— **Circle Inform-A-Gram No. A37**

Landmaco Threading Machines, Models C, are discussed in a bulletin which gives dimensions for the five sizes, which range from ¼" to 2½" in single- or double-spindle models. Bulletin H-76-2 can be obtained by writing Landis Machine Co., Waynesboro, Pa., or — **A38**

FRICTION SAWING with Tannewitz

HIGH SPEED BAND SAWS

FASTEST, BEST MEANS OF CUTTING METALS

If you are not familiar with the advantages of friction sawing with these machines, by all means drop us a line asking for "Friction Sawing Data." You can save many times the cost of a Tannewitz High Speed Band Saw and greatly expedite production by using it to cut sheets of both hard and soft steel, formed or flat, trimming malleable and steel castings, cutting armor plate or many other materials. Write NOW!

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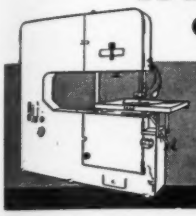
GRAND RAPIDS, MICHIGAN ☎ GL-6-1729



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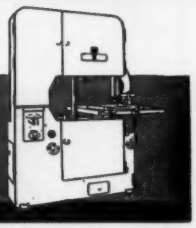
The smoothest, fastest, most trouble-free Di-Saws on the market. Write for bulletin.



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The Inform-A-Gram card which follows page 100 is for your convenience in making inquiries about advertised Products and Editorial items.

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SAVES YOU COSTLY SECONDARY FINISHING OPERATIONS

Avoid scratches like this — All clear with "Relievomatic!"

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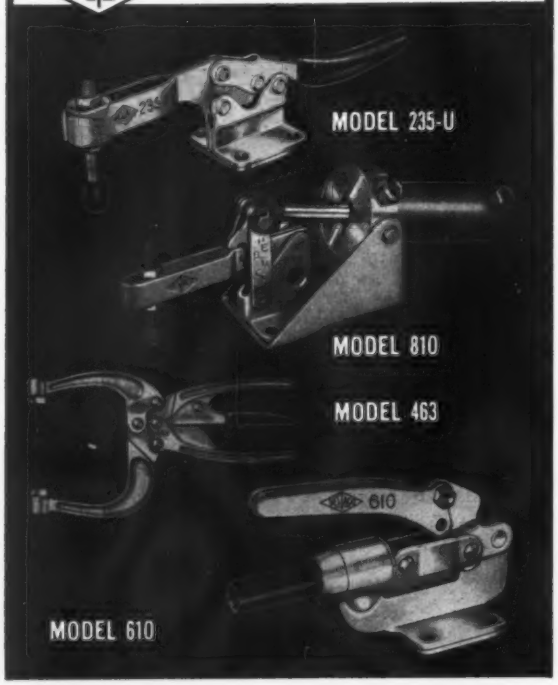

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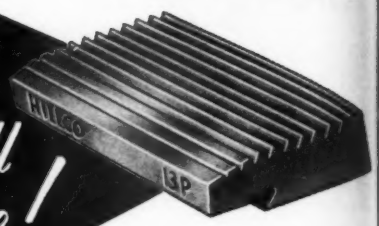
We think you'll agree!



The new line of "HILLCO" Tangent Chasers, which can be re-ground for 80% of their original length, are guaranteed to be of highest grade tool steels ground to exacting tolerances. We feel that this complete line of chasers are the finest that we have produced in our 75 years of cutting tool manufacture. We think that you will agree with us.

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ACME MACHINERY DIVISION
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You carry identification as a safety factor — a form of insurance. **Insure your sales by marking your products.** Be protected against confusion in re-ordering, and the loss of customer good will.

If It's Worth Making, It's Worth Marking.

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GEO. T. SCHMIDT, INC.
4112 Ravenswood Avenue
Chicago 13, Illinois

CIRCLE INFORM-A-GRAM KEY NO. 1043

Redesigned Precision Spindles are listed in dimension-chart form in a catalog from The Cincinnati Electrical Tool Co., 388 Mt. Hope Ave., Cincinnati 4. Sizes range from

½ hp to 10 hp, and permit selection of single or compound feeds to develop composite units. Write to the company for Catalog S-58, or—

Circle Inform-A-Gram No. A39

Extreme Rigidity, high precision, and low overall height of only 5¼" with a 4" jaw capacity are features of the improved Model 1A Wesson universal angle vise. It's ideal for heavy-, medium-, or light-duty milling, drilling, boring, and grinding,

and has a wedge-type movement that locks to assure setup rigidity up to 3,000 lbs torque loading. Wesson Co., 1220 Woodward Heights Blvd., Detroit 20, or — **No. A40**

Single-Spindle and Rotary Hobbing Machines are detailed in a bulletin which illustrates features and some cost-cutting uses of these machines. Information on flexibility of automated, semi-automated, and manual Rigidhobbers is also included. Write to Cleveland Hobbing & Machine Co., 1311 Chardon Rd., Cleveland 17, for your 12-page catalog, or — **Circle No. A41**

Combine Two, Three, Four, or more related machining operations, and do them at the same time, with the tools described in the 16-page catalog, "Special Production Tools." Information on reaming, boring, roughing, and finishing tools is included. Bulletin S-19 is available from McCrosky Tool Corp., Meadville, Pa., or — **Circle No. A42**

High Accuracy in all dimensions is assured for these T-shaped cut-off blades by this method of grinding. The top of each blade is ground with a radius so chips are crimped,

resulting in cooler running tools and less scoring on the sides of the cut. For blade information, write The Cleveland Twist Drill Co., 1242 E. 49th St., Cleveland 14, or —

Circle Inform-A-Gram No. A43

Machining

PRODUCTS & PROCESSES & PRODUCTS

Economical Tube Cutting, by using the Brehm tube cutter, is explained in a pamphlet that points out how this cutting method is faster, without any loss of stock. The literature describes how this automatic machine has a great range of cutting thicknesses and other dimensions. Ask for the bulletin from Steel Products Engineering Co., Div'n of Kelsey-Hayes Co., Springfield, Ohio, or — **Circle No. A44**

Recent changes and additions provide many bonus features.

Unobstructed perimeter (work from any side!)

Six Wheel Models

Capacities to 5,000 pounds.

LIFT LOWER TRANSPORT with PORTELVATOR®

The Handy HAMILTON Portable, Elevating Table

3 table surfaces
4 point support

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Special Designs tool

More Service for Less Money than Any other unit of equipment

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Stocked in standard styles for immediate delivery.

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RIVETT

RIVETT LATHE & GRINDER, INC., Department CTP-11, Brighton 35, Boston, Mass.

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FLEXIBLE SHAFT MACHINES

designed especially for lighter duty precision deburring and finishing

durable for production as well as tool & die work

SINCE 1922 SERVICE DEPENDABILITY

Every Foredom's a little powerhouse, yet handles like a fountain pen. That's why jobs go faster! Choose for your special purpose from an unusually wide variety of interchangeable handpieces.

Thousands of Foredoms in use for over 35 years in toolrooms, for production and maintenance. Bench and hang-up models. Finest you can buy – and your industrial distributor will supply. Catalog on request to dept. N-8.

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Just lock Burr-Bit on any make tap and holes are deburred automatically, leaving a smooth clean chamfer. ONE OPERATION, ONE SETUP, ONE HANDLING.

NEW ADDITION
Now Burr-Bit fits 3 fluted taps from #6 to ½". Also available to fit any tap 2 or 4 fluted from #2 to ¾".

A quality product made of the finest high speed tool steel for use on almost every material.

WRITE now for complete data and reports from engineers who have adapted Burr-Bit and saved on their tapping operations.
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CIRCLE INFORM-A-GRAM KEY NO. 1062

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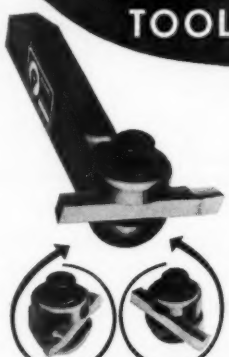
Universal—Positioning TOOL HOLDER



- Holds any square or round tool bit or boring bar (carbide tip or high-speed steel) 3/16 to ½" in any horizontal position in a complete circle.
- Does the work of six old-fashioned fixed position holders and eliminates having separate holders for each type cutter.
- Rotating clamping cap and forged shank hold tool in perfect grip, no chatter when cutting.
- Low Cost • Cuts Inventory

AA-8184

Ask your mill supply house or Maxwell representative

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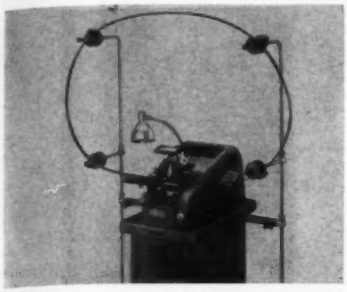
CIRCLE INFORM-A-GRAM KEY NO. 1064

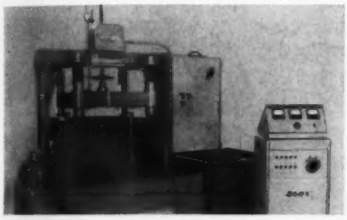
A New Attachment for Hamco saw sharpening machines now automatically sharpens band saw blades. The guide table holds ¾" to 2" wide blades. This machine also handles



circular, band, or hack saws, and can be used on steel, brass, aluminum, copper, and bronze. Hamco Machines, Inc., Dept. M, 99 Mt. Hope Ave., Rochester 20, N. Y., or —

Circle Inform-A-Gram No. A45

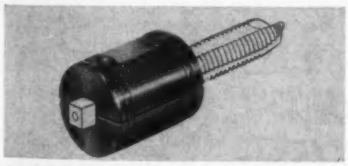
Remove Metal and finish the part by electro-chemical machining. By using an electrode submerged in a saline solution with the workpiece, metal is removed faster and safer



with little preparation and little wear to the electrode. Get details from The Research Div'n, Elox Corp. of Michigan, 1830 N. Stephenson Hwy., Royal Oak, Mich., or —

Circle Inform-A-Gram No. A46

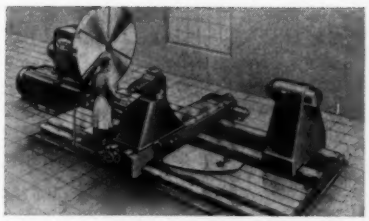
This Bushing has a split-type construction with two flat spring collars on each end to maintain bushing alignment and provide spring tension for tap adjustment. The square part of the tap is inserted



in the square part of the bushing to prevent slippage. Quick setup time and longer tool life are features. RingO Co., P. O. Box 863, Dayton 1, Ohio, or —

Circle A47

For Turning Operations on cylindrical, conical, or developed shapes on light weight long and round pieces of great length, use the new Lucas lathe, available in semi-automatic and tape-controlled fully-automatic



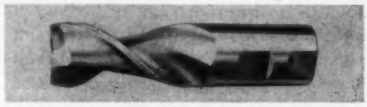
models. Lathes with up to 96" swing over bedways and up to 192" in length are available. Lucas Machine Div'n, The New Britain Machine Co., 12302 Kirby Ave., Cleveland 8, or —

Circle A48

Machining

PRODUCTS & PROCESSES & PRODUCTS

Mill Aluminum and aluminum alloys with these high speed steel end mills introduced by Brown & Sharpe Mfg. Co., Providence 1. They feature



generous chip clearance, improved performance, and longer tool life due to use of abrasion resistant high speed steel. Get details from the company, or —

Circle A49

HAMILTON

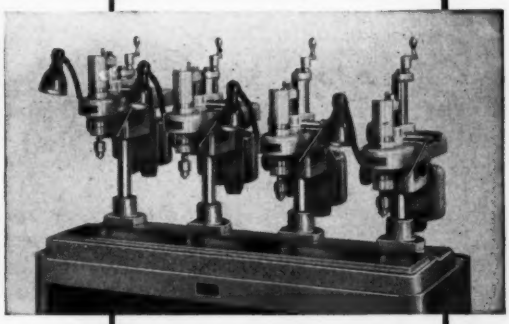
SUPER SENSITIVE, SMALL-HOLE

PRECISION

REPEAT

PRECISION

DRILLING MACHINES



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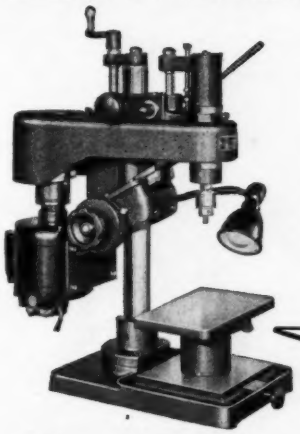
SINGLE OR MULTIPLE SPINDLES • VARIOUS CAPACITIES • WIDE RANGE OF CLEARANCES • VARIABLE SPINDLE SPEEDS • COMPANION TAPPING MACHINES



Designed and built to *master* the heart-breaking jobs which are so often attempted on drilling machines of "standard" accuracy.

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WE WILL SUPPLY IT

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THE HAMILTON TOOL COMPANY
832 South Ninth Street
HAMILTON, OHIO

IT'S A Hamilton Tool
USE IT WITH CONFIDENCE

2467

CIRCLE INFORM-A-GRAM KEY NO. 107

Machining

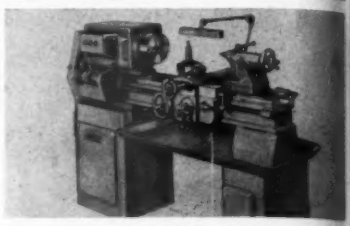
PRODUCTS & PROCESSES & PRODUCTS

"How to Ruin a $50,000 Machine," or confidential information for subversive agents and saboteurs, is a dramatic presentation of three ways to ruin boring machines or other machines using single-point tungsten-carbide cutting tools. The importance of sharpening is explained. Booklet 13-25-14 is available from The Heald Machine Co., 3 Bond St., Worcester 6, Mass., or —

Circle Inform-A-Gram No. A50

For Light and General Purpose Operations, use the line of positive rake disposable insert toolholders announced by the Metallurgical Products Dept., General Electric Co., 11177 E. 8 Mile Rd., Detroit. These toolholders come in 54 types, both right and left hand, with a variety of shank sizes. For details, write the company, or — **Circle No. A51**

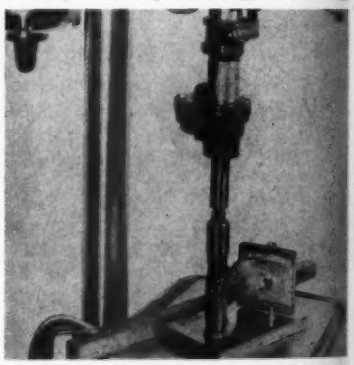
The New 15" Sheldon Lathe combines geared-head lathe big capacity and power with belt-driven lathe economy and flexibility. Dimensions include 15¼" swing over bed ways, 40 to 1240 rpm speed range, 1½" hole through spindle, and 8" cross-slide travel. Sheldon Machine Co., Inc., 4258 N. Knox Ave., Chicago 41, or — **No. A52**



Improve Precision and Economy in drilling operations by using the hints given in "You're On the Road To Better Drilling," published by Cincinnati Lathe and Tool Co., 3207 Disney St., Cincinnati 9. Spiral point drill geometry is explained, and tips on selection of drill speeds and feeds are discussed. Get a copy from the company, or — **Circle No. A53**

Equip a 20" Drill Press for heavy-duty work with this Slo-Speed attachment. It provides smooth, high torque, power transmission for a variety of spot-facing, reaming, counter-boring, and core drilling operations. Spindle travel with this attachment is 4 15/16". Rockwell Mfg. Co., Delta Power Tool Div'n, 496 N. Lexington Ave., Pittsburgh 8, or —

Circle Inform-A-Gram No. A54

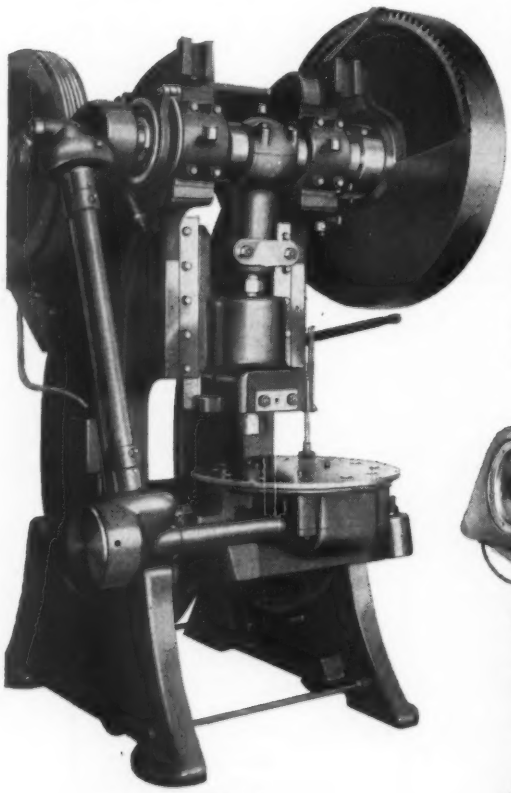


A Very Heavy-Duty sulphur-free cutting fluid, Tap-Cut 35, manufactured by United Laboratories, Inc., is used for ferrous and non-ferrous metals. It reduces tool wear on low and medium tensile steels by keeping interface temperatures below the critical point. To get your sample, **Circle No. A55**

Modern FEDERAL Dial Feeds give you

automation at less cost!

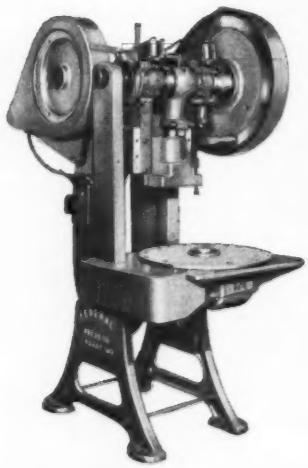
—eliminate specialized and more costly equipment!



No. 7 Dial Feed
Gear Driven. Capacity, 80 tons.

Federal Dial Feeds are your answer to greater production at lower costs. Equipped with special jigging, automatic feeds and ejectors, their applications are virtually unlimited and the need for specialized, more costly equipment often eliminated. (Example, one manufacturer increased production 600%.)

Add Federal's quality features and workmanship . . . and you've got a winner. Investigate Federal Dial Feeds for your operations. Gear or chain driven with cam-type indexing mechanisms. Sizes range from 6 to 80 tons.



No. 3 Dial Feed
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33 Years' Experience in Dial Feed Engineering and Construction

CIRCLE INFORM-A-GRAM KEY NO. 108

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This catalog shows the most complete line of work holding tools available anywhere for production on milling machines and drill presses . . . angle vises . . . drill press vises . . . swivel machine vises . . . adjustable angle plates with or without swivel bases . . . production vises . . . heavy duty angle vises . . . rotary and indexing tables for use on milling machines and drill presses . . . milling attachments for milling on lathes.

There are 68 different models and types of Palmgren vises, rotary tables, milling attachments and other machine tool accessories, with jaw sizes from 1½" to 8". Ask for your copy of this FREE Catalog No. 205 today, showing the complete line, details and prices.

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CHICAGO TOOL and ENGINEERING CO.
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CIRCLE INFORM-A-GRAM KEY NO. 1091

This AIR PRESS has positive, exact depth stops

Many job changes can be made by quick, simple stop nuts, without touching column adjustment. Rigid, solid steel column, and heavy surface-ground base.

One of nine sizes and models in the great dependable Mead Air Press line.

Write for complete information!

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PATHFINDER IN AIR POWER AUTOMATION

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CIRCLE INFORM-A-GRAM KEY NO. 1093

Aget offers more! Over 38 standard Dustkop models to choose from . . . *Plus* engineering service to help you select, provide, and install the proper accessories and fittings to complete your dust collecting system. Write for illustrated folder . . . Today!

AGET MANUFACTURING COMPANY
1394 E. CHURCH STREET • ADRIAN, MICHIGAN

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For 2, 3 or 4 spindle drilling you can do it better, faster, at lower cost with U. S. Standard Adjustable Heads.

More reserve stamina built in . . . antifriction bearings . . . high alloy steel spindles and shafts . . . heat treated and shaved gears . . . more than ample spindle bearing . . . parts run in oil (oil-mist for speeds around 4000 rpm).

Standard Adjustable 3-spindle head, all spindles adjustable. Five styles—2 to 4 spindles, up to 1⅜" drill sizes, up to 15" bolt circles.

Write for catalog AD-57

US DRILL HEAD

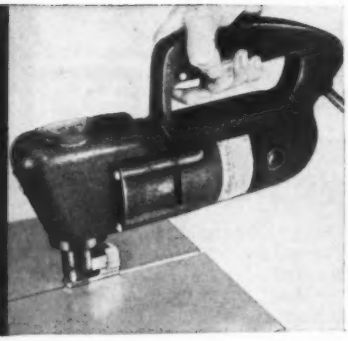
Adjustable and Fixed Center Multiple Drilling Heads. Individual Lead Screw Multiple Tapping Heads.

UNITED STATES DRILL HEAD CO.
616 BURNS STREET • CINCINNATI 4, OHIO

CIRCLE INFORM-A-GRAM KEY NO. 1094

CUT METAL *FAST,* WITHOUT DISTORTION USE

MODERN NIBBLERS



They cut 10 gage stainless, 8 gage mild steel, 7 gage aluminum and brass without bending or curling the metal.

They cut 6" (and smaller) radius.

Models are available for cutting corrugated metal, fibre glass and plastic without cracking or chipping. Other models for cutting wire netting, irregular rods, gaskets, etc.

A MODEL FOR CUTTING ¼" COLD ROLLED STEEL AVAILABLE SOON!

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Marking Tools, marking machinery, and equipment are featured in a catalog from Geo. T. Schmidt, Inc., 4112 N. Ravenswood Ave., Chicago 13. The 192-page catalog includes sections on engraved stamping dies, pneumatic, hydraulic, and mechanical marking tools. Get Catalog 16 from the company, or — **Circle A57**

"Quality Control in Production of Chemically-Milled Parts" tells what chemical milling can do, when to inspect for tolerances, and the resulting surface finishes on aluminum, steel, magnesium, and titanium. For Bulletin 6, write United States Chemical Milling Corp., 1700 Rosecrans Ave., Manhattan Beach, Calif., or — **Circle A58**

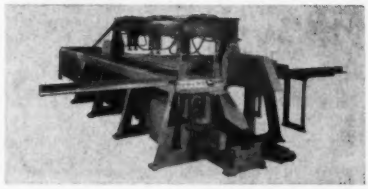
A Mechanical Feed Milling Machine is introduced in a bulletin by Sunstrand Machine Tool Co., 2531 11th St., Rockford, Ill. The bulletin gives the machine's outstanding features, dimensional drawings, and specifications for three models of the C1 Rigidmil. Get a copy from the company, or — **Circle A59**

Roller Gear Drive Indexing Mechanism characteristics in the line of Intermittor index tables and rotary transfer machines, are presented in a new catalog. Tips for choosing the right Intermittor for your job, diagrams of typical assemblies, and specifications are given. Contact Ferguson Machine Corp. of Indiana, 7818 Maplewood Industrial Court, St. Louis 17, for Catalog 302, or — **Circle Inform-A-Gram No. A60**

For High Speed Precision Holes Production from the solid, use the Starbore carbide gun drills featured in a bulletin. Application information includes drill construction, sharpening, tool life, specifications, and machine tool and coolant requirements. Catalog SC-100 is available from Star Cutter Co., P. O. Box 376, 34500 Grand River Ave., Farmington, Mich., or — **A61**

This Heavy-Duty Production Saw is for precision cutting of aluminum, bronze, copper, brass, and other nonferrous metals. The Oliver 838 plate

Machining



saw comes in 4′ to 40′ lengths and longer, in 4′ increments. The feed motor gives speeds from 1 to 40 ft/min. Oliver Machinery Co., 1025 Clancy, N. E., Grand Rapids, Mich., or — **Circle A62**

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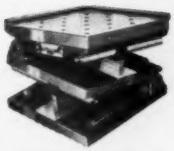

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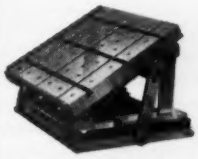

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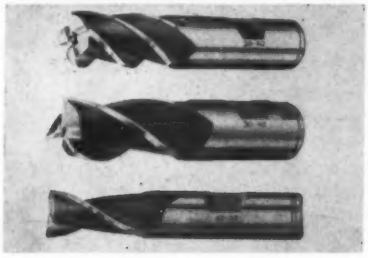

machining of other tough to cut high-strength heat-resistant metals. Series 30-40 and 40-50 come in styles and sizes for cavity milling, slotting, elongating, surface milling, and spot facing. Illinois Tool Works, 2501 N. Keeler, Chicago 39, or — **No. A63**

Machine Tool Attachments with endless variations are listed in a bulletin that also shows how they can be used. Specifications for the different models, in chart form, are also given. For your copy of Bulletin 215B, write The Standard Electrical Tool Co., 2488-96 River Rd., Cincinnati 4, or — **Circle No. A64**

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★ Gibs Take Up Wear

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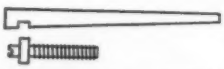

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vitron, Model 200-B2, handles cutting, drilling, engraving, slicing, dicing, and the production of complete shapes and forms. For details, write to The Sheffield Corp., Dayton 1, Ohio, or — **Circle No. A65**

A Pneumatic Drill bulletin covers nine types of these drills including light-weight, high-speed, and heavy-duty models. Each model is described and specifications are given in chart form for easy selection. Get a copy from Air Speed Tool Co., 1502 W. Slauson Ave., Los Angeles 47, or — **Circle Inform-A-Gram No. A66**

These Milling Spindles convert planers or other machines into high production milling machines. Now the 50-hp-geared units give optional speeds from 225 to 1200 rpm, and

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A 28-Page Catalog gives some tool application problems and solutions with a line of screwless fast-production vises and automatic self-centering air vises. Information on the fixture lock vise, band saw vise, safety drill vise, and cam lock vise is included. Write Heinrich Tools, Inc., Racine Wis., for Catalog 158, or — **Circle Inform-A-Gram No. A68**

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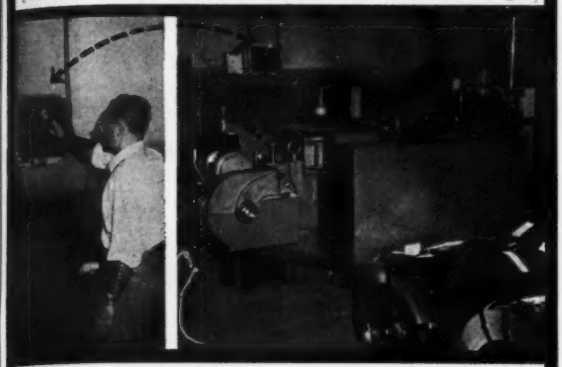

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This cold-header automatically stamps out clock parts in complete safety. MONITRON will stop, the machine the instant that it senses a load change, pile-up, misfeed, dull tool, oversize stock, faulty lubrication, etc.

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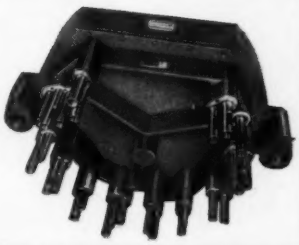

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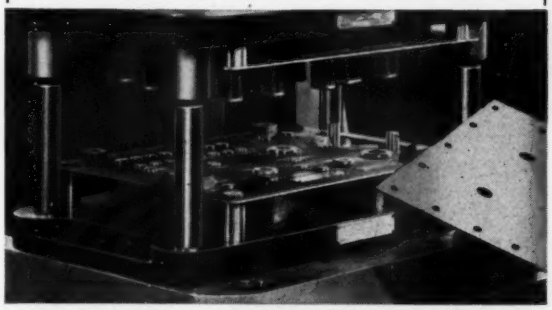

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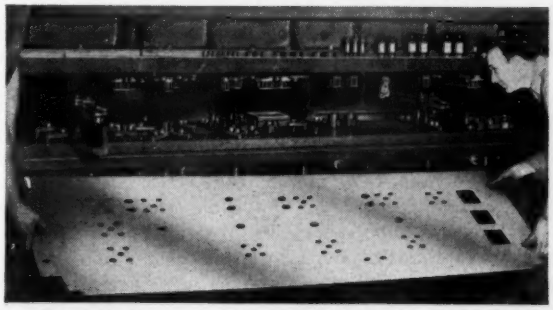

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Tooth spacing accuracy of a 22.500", 720 tooth gear, produced by Vinco, being checked on a dividing head.

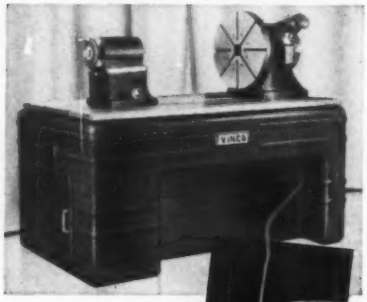
GEAR SPECIFICATIONS

720 teeth; 32 diametral pitch; 14½° pressure angle; 22.500" pitch diam.

Tolerances	Specified	Measured
Total composite error	.0006"	.00035"
Total index error	.0007"	.0002"

GUARANTEED ACCURACY—2 seconds of arc. SPINDLE RUNOUT less than 25 millionths of an inch. Such accuracy is a "MUST" as a final inspection authority on aircraft precision components, critical parts and assemblies of missile guidance systems, precision gear trains, index plates, cams, automatic controls, the calibration of involute checkers and master involutes. Either cast iron or granite surface plates available on Vinco dividing heads. All Vinco surface plates have a flatness accuracy within .0002".

Model 55—38 is available either with a 20" x 40" surface plate; capacity between work centers 22", or a 20" x 72" surface plate; capacity between work centers 54". Both have a work swing of 12 7/16" dia.



The heavy duty dividing head is built to handle work with a swing up to 24 7/16" dia. Surface plate is 36" x 72". This model has the same accuracy as the standard model.

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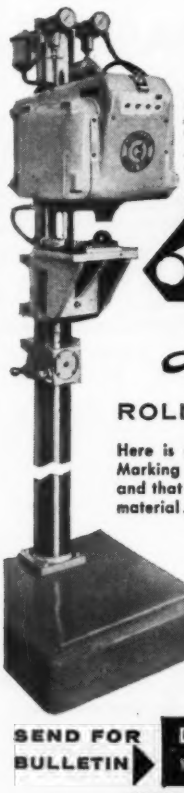

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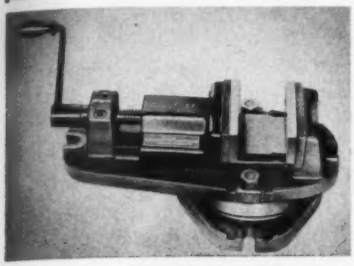

long life, and hardened and ground alloy steel jaws 5″ x 1¾″. Nichols-Morris Corp., 76a Mamaroneck Ave., White Plains, N. Y., or — **A69**

A High-Speed, Precision Tracer Attachment for automatic and pencil-trace machining of difficult contours in castings, forgings, dies, and production work from originals, models, or templates, is detailed in a bulletin. It explains the advantages and shows how the E Series Duplimatic works. Request this bulletin from Tracer Control Co., 595 E. 10 Mile Rd., P. O. Box 6, Hazel Park, Mich., or — **Circle A70**

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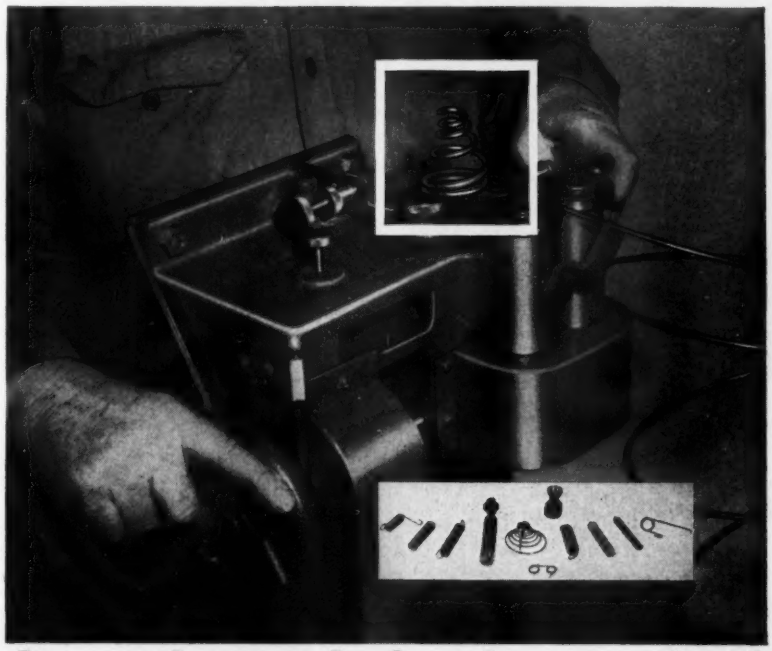

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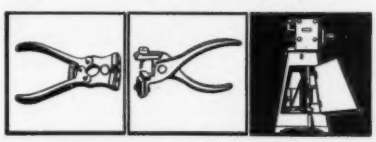

Starret adjustable jaw cut nippers (left) and Gardener Hook-Kon spring looping tool (center) — handy, precision, time-saving accessories for spring coiling. Perkins Spring Coiler available as bench model or power model shown here, (right) for tool shop or continuous runs.

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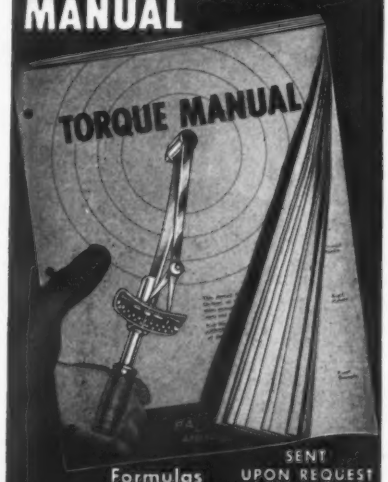
"TORQUE WRENCH" MANUAL



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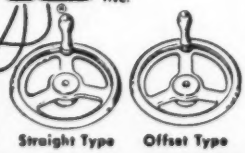

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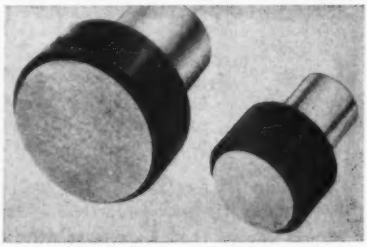

and with drilled and C-bored holes for socket head screws, in 18 sizes. Jergens Tool Specialty Co., 712 E. 163rd St., Cleveland 10, or—

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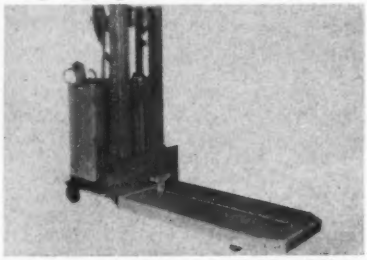

26" wide platform available, 36" to 60" long in 6" increments. Industrial Truck Div'n, Clark Equipment Co., Battle Creek, Mich., or—

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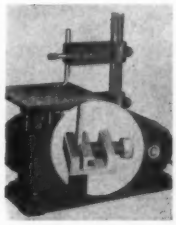
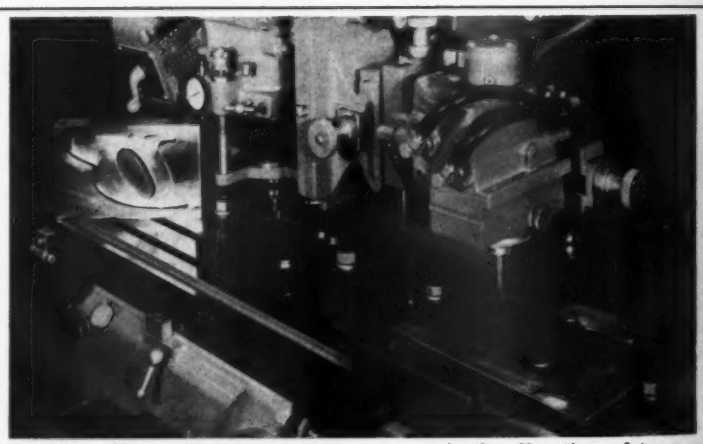
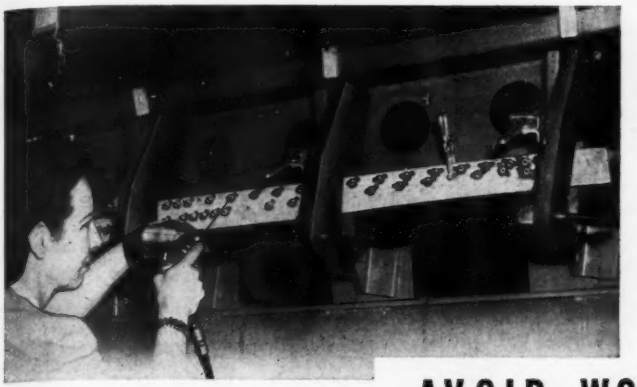


Easier Changing of Files on Keller die filers is accomplished with a new file chuck. A floating jaw, when tightened by a single screw, automatically accommodates itself to any shape of shank, permitting faster file changing with less adjusting. For more information, write Sales Service Machine Tool Co., 2363 University Ave., St. Paul 14, Minn., or—

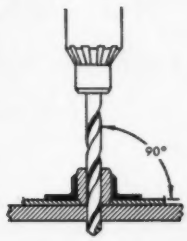
Circle Inform-A-Gram No. A76



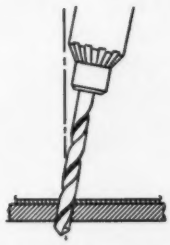
The New Contourmaster Milling Machine, equipped for three-dimensional, hand-guided, hydraulic, tracer-controlled milling, was designed for rapid, economical production of small- to medium-sized tool and die work. The 3D unit controls the direction of traverse of the table and saddle for 360° for horizontal profiling, and the vertical movement of the spindle quill for vertical profiling. The Cincinnati Milling Machine Co., Cincinnati 9, or — **Inform-A-Gram No. A77**



Free hand drilling of perpendicular holes using Anchor Bushing Drill Template at Ryan Aeronautical Co., San Diego.

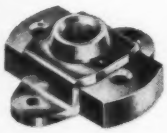


ANCHOR BUSHING DRILL TEMPLATE — DRILL SUPPORTED AT LOW COST.



UNBUSHED DRILL TEMPLATE FOR LOW VOLUME PRODUCTION — NO DRILL SUPPORT.

AVOID WORK SPOILAGE—USE ANCHOR BUSHING DRILL TEMPLATES



NUTPLATE ANCHOR BUSHING

STANDARD ANCHOR BUSHING

Rejects threaten when unbushed drill templates are used to replace expensive drill jigs or fixtures on small quantity production runs.

Being low in cost and easy to make, Anchor Bushing drill templates prevent off-perpendicular drilling, inaccuracies of hole location and the use of wrong drill sizes.

Anchor Bushings are riveted or spot-welded to sheet metal, and riveted on or imbedded in laminated plastic materials. These lightweight drill templates can be made flat or in compound curves for a fraction of the cost, time and skill required for drill jigs or fixtures.

Learn how to make low cost, accurate drill tooling — write for the Anchor Bushing Catalog.

hi-shear RIVET TOOL COMPANY

2600 WEST 247TH STREET • TORRANCE • CALIFORNIA

Sales Representative for Kirk-Wing Company, Vega Baja, Puerto Rico.

CIRCLE INFORM-A-GRAM KEY NO. 1171

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- QUARTER TURN SCREWS
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CATALOG INCLUDES TRACING TEMPLATES

Northwestern NORTH WESTERN

116 HOLLIER AVE., DAYTON 3, OHIO

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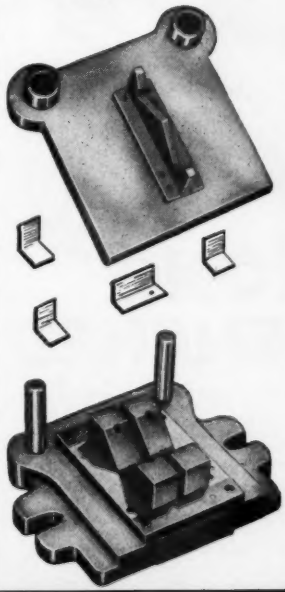
Punches and Dies

Angle Iron Cut Off Die



No. 18, cut off die, for 2" x 2" x ¼" and lighter angles. Mounted in leader pin die set. Fits 'most all makes of 25-ton and larger presses. Simple shearing action insures straight, clean cut WITHOUT DISTORTION. Another of the many different kinds of punches and dies in stock or made to order for foot, hand or power operation. Also adaptors and die shoes to convert your press. Each precision-made.

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What are your punch and die needs? Consult us about your problems. Prompt service on "specials" made to your order.

SEND FOR FREE CATALOG NO. 157 AF, illustrating our standard punches and dies and complete line of modern sheet metal fabricating equipment. **NET PRICES SHOWN.**

WARD Machinery Co. 564 West Washington **Chicago 6**

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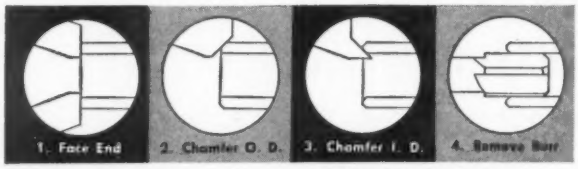
DOES 4 JOBS AT ONCE



- Replaceable cutters
- Replaceable pilot reamers
- Adjustable for size control
- Easily reground in your plant

Standard sizes for 3/16" to 1-1/4" tubing.

Write for Bulletin 46P

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Adjustable Hollow Mills · Facing and Counterboring Tools · Special Production Tools
Tube Deburring Tools · Since 1908

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INCREASE PRODUCTION.. SAVE TIME & MONEY

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1. Tungsten carbide rings at the points of wear; 2. Steel rings protect drills and carbide; 3. Special hardened alloy steel body.

For information and prices write for MEYCO Bushing Catalog No. 41

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Carbide Inserted Bushings Are Doing It Daily!

How? Like this: (1) Last longer . . . with a life—in most cases—as long as solid carbide bushings at prices that approach the price of steel bushings; (2) Increased life for your drill jigs and fixtures; (3) Increased life for your drills and reamers; (4) Accuracy maintained for a LONG PERIOD of time; (5) Less non-productive machine time, less lost man-hours, because bushings need not be changed as often; (6) Inspection time saved, because of greater accuracy for a longer time; and (7) Less waste due to spoilage, for the same reason. Don't pass up a good bet! Get the dope on MEYCO Carbide Inserted Drill Jig Bushings today!

ESTABLISHED 1888

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Fine tools that encourage Good Work

ARMSTRONG WRENCHES

If you don't know your local ARMSTRONG Distributor we will send you the name of those in your area.

An ARMSTRONG Wrench feels right—is balanced. It goes over nuts or screw heads easily, grips firmly without sloppiness, won't round corners—because openings are carefully machined to correct sizes. It's safe, strong beyond need without clumsy bulk—because of superior design and selected steels, heat treated to proper degree of hardness and tensile strength. It's quality finished, ARMALOY (alloy steel) Wrenches in chrome plate with heads buffed; HI-TEN (carbon steel) Wrenches in baked-on gray enamel with heads ground bright . . . all plainly marked for size. All are uniformly excellent tools manufactured under strict quality control, by modern methods, with modern equipment in a modern tool plant . . . 1537 different industrial sizes and types—single wrenches, or sets in metal cases, boxes or rolls . . . each a quality tool. Armstrong Wrenches are "Fine tools that encourage good work."

ARMSTRONG BROS. TOOL CO. 5228 W. ARMSTRONG AVE. . CHICAGO 46, U.S.A.

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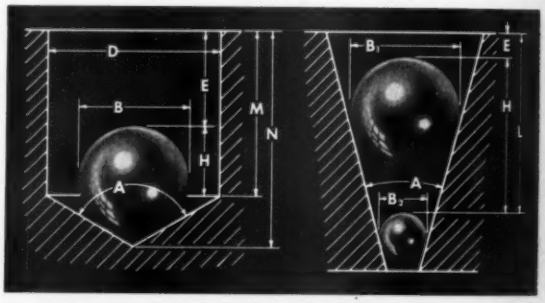

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- **For simplified checking** of hole depth, ID's, internal tapers — locating holes and internal grooves — many other applications in shop, tool room and gage room.
- Accurate to .000010" on size and sphericity. Hardened and cold-stabilized for lasting precision.
- Furnished in sets or individually — 3/64" to 1" or larger.

FREE BULLETIN 552 gives methods and formulas for hole-checking, and details on Master Balls. Write for it!

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ANN ARBOR, MICHIGAN

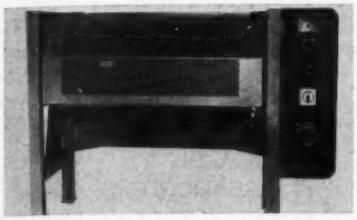
CIRCLE INFORM-A-GRAM KEY NO. 1184

Grinding & Finishing

PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS

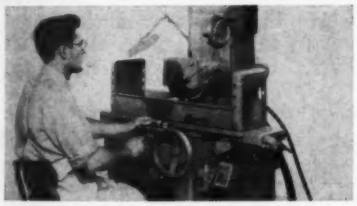
A New Type of Sintered Metal Tumbling Media has been introduced by Dixon Sintaloy Inc., 535 Hope St., Stamford, Conn. The new media permits precise control of material hardness, shape, porosity, and surface characteristics for grinding, deburring, or finishing applications. Write the company for information, or — **Circle A78**

This Versatile Finishing Machine handles high production runs. The compartments can be interchanged to fit special finishing needs. Model



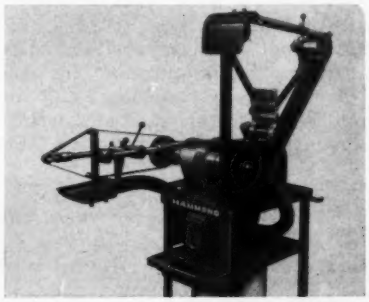
V8's multi-compartment barrels also permit processing different types of workpieces at the same time. Rampe Mfg. Co., 14915 Woodworth Ave., Cleveland 10, or— **Circle A79**

A New DoAll Precision Hand Grinder reduces operator fatigue and is accurate enough for toolroom work or production runs. A 6" adjustment on Model DH-612 gives the

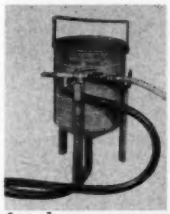


individual operator the best height for standing or sitting, and the downfeed handwheel, 12" out from the column, is at eye level. The DoAll Co., Des Plaines, Ill., or— **Circle Inform-A-Gram No. A80**

The Combination Abrasive Belt Grinder-Polisher has the U-1 head for various types of flexible belt grinding operations. Model UBG-50 provides more throat depth for awkward-shaped parts and a small head



for flexible belt and internal grinding. Get details from Hammond Machinery Builders, Inc., 1631 Douglas Ave., Kalamazoo, Mich, or— **Circle Inform-A-Gram No. A82**



Quickly and Easily Clean Rust, paint, carbon, dirt, and weld scale from moldings, seams, and corners with this Sandy Jet Spot Blaster. It's ideal for large areas or spot blasting in hard to reach places. The tank holds 12 qts of abrasives or liquid detergents. A. L. C. Co., 646 Oak St., Medina, Ohio, or— **Circle Inform-A-Gram No. A83**

"Acme Mirro-Lap Grooving Tools" in solid carbide, carbide tipped, cast alloy, and high speed steel are pictured in a bulletin. It gives a quick visual guide to typical types of grooving and cutoff tools produced by Acme Grooving Tool Co., 25606 W. 7 Mile Rd., Detroit 40. **Circle Inform-A-Gram No. A84**

This Mity-Mite Installation, for large production in limited space, can be operated by one man. The centrally located jib boom provides rapid, easy handling of individual barrels between mechanized units and unloading equipment. Speed-D-Burr Corp., 3613 San Fernando Rd., Glendale 4, Calif., or— **Circle Inform-A-Gram No. A81**

"We Are Extremely Well Pleased With TRICO-MIST"

(Name On Request)

This production manager writes: — "We had difficulties with a drilling operation on aluminum. After installing a TRICO-MIST, we were able to increase production at a lower cost of operation and turned out a better finished product. We are extremely well pleased with the TRICO-MIST Coolant System."

Yes, For As Little As $22.00

you too can increase production, obtain finer finishes and accuracy on all your drilling, tapping, milling, sawing, grinding and other operations.

Get Complete Details

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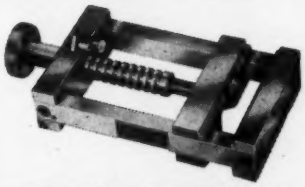
TRICO FUSE MFG. CO
MILWAUKEE WIS U.S.A.

CIRCLE INFORM-A-GRAM KEY NO. 1191

ESSENTIAL



PRODUCTO TOOLROOM VISE

Producto's Precision Toolroom Vise is essential equipment for your jig borers, surface grinders, drill presses, tappers. It's extremely strong, yet weighs only 13 lbs. and has a 2" high frame. Has large jaw opening, will clamp heavy as well as light workpieces. All surfaces hardened and ground. Works on five surfaces. Write for Bulletin TE2-103.

THE PRODUCTO MACHINE CO.
970 Housatonic Avenue
Bridgeport 1, Connecticut

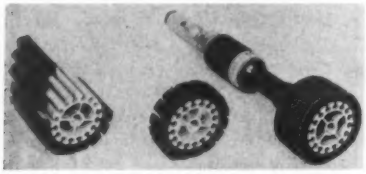
CIRCLE INFORM-A-GRAM KEY NO. 1192

Grinding & Finishing

PRODUCTS & PROCESSES & PRODUCTS

A New Expanding-Type Grinding Wheel for abrasive belt operations is now available in any width up to 8". Model 004 is 4" in dia and features a new light core design that facilitates custom sizing of the individual wheels to meet specific requirements. It also retains the abrasive band under all operating conditions. Nu-Matic Grinders Inc., 8224 Carnegie Ave., Cleveland 3, or—

Circle Inform-A-Gram No. A85

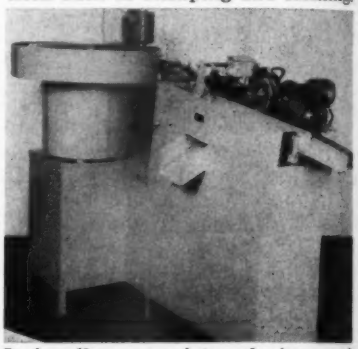


This Rotary Dial Conveyor is an indexing type for use with polishing, buffing, and brushing head units on automatic installations. The workholding dial on Model RJ has six ball-bearing-mounted fixture spindles of 1½" dia.

x 3". An adjustable rate of 120 to 18,000 indices/hr and adjustable fixture spindle speeds from 12 to 100 rpm are possible. Divine Brothers Co., Seward Ave., Utica, N.Y., or—

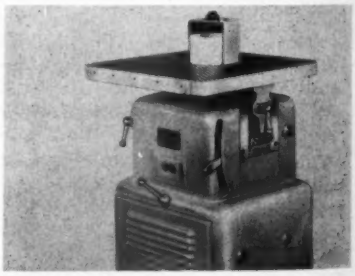
Circle Inform-A-Gram No. A86

Feed Cylindrical Parts to a centerless grinding machine with this parts feeder. It's ideal for ball bearings and needle bearing races, and can also feed similar parts to operations such as stamping and forming.



It handles a variety of sizes and shapes (from ⅜" to 3" dia) at the same time. U. S. Engineering Co., 40-21 22nd St., Long Island City, N.Y., or— **Circle No. A87**

A New Profile Grinder with 6" dia wheel will finish large dies and do other similar contour grinding operations with efficiency. This new size machine is a single-spindle



model with a bigger table to accommodate larger and heavier work than other models in this line. Boyar-Schultz Corp., 2000 S. 25th Ave., Broadview, Ill., or— **Circle No. A88**

STURDY NICHOLS VERTICAL HEAD . . . has No. 40 Taper Spindle
NICHOLS SWIVEL VISE is a true precision unit equipped with verniers . . . only two of many available accessories.
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TOOL
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ni

STANDARD MODEL—A precise, versatile Hand Miller with Rise and Fall spindle. Table size 6¼" x 21".

ACCURACY—SENSITIVITY—VERSATILITY

Gives the tool room what it demands—a compact, rugged miller with extreme accuracy and utmost flexibility. The Nichols TOOL ROOM MILLER is arranged for sensitive hand screw feed, has generous table surface—8½" x 30" with 19" longitudinal travel. Precision feed screws have oversize, easy reading micrometer dials. Large hand wheels provide element of "feel" so important in precision milling. Rise-and-Fall Spindle simplifies set-ups. Lever table feed, furnished in addition to screw feed, increases usefulness. Selective speed ranges up to 5000 RPM.

2 educational 16 mm sound color films available for free showing—send for descriptive letter and reservation form.

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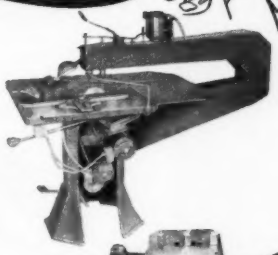
CIRCLE INFORM-A-GRAM KEY NO. 120

THE INFORM-A-GRAM CARD FOLLOWS PAGE 100 IN THIS ISSUE.

Better think about "cookie cutter" dies

They offer you time and cost savings up to 90%

- Shearing
- Blanking
- Punching
- Piercing



"Electromatic" Super Die Saw - 42 x 52" table, 50" Jig throat. Built in 4 sizes, 24" 30" 50" 74" throat

Atlas straight steel rule cutting machine #3ACS

"Multiform" heavy duty bender #4HDC

YOU CAN MAKE STEEL RULE DIES FASTER, BETTER AND CHEAPER WITH RICHARDS' STEEL RULE INDUSTRIAL DIE-MAKING EQUIPMENT

No doubt about it . . . you can count on substantial reductions in production costs involving dies when you put J. A. Richards equipment to work in your plant. Fifty years of manufacturing experience as the originators and pioneer manufacturers of steel rule die making equipment backs up every one of Richards' complete line of "Multiform" Heavy Duty Benders and Cutters, and "Electromatic" Precision Die Saws.

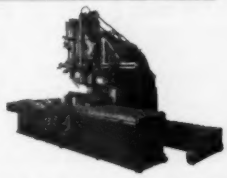
Write today. We'll show you just what Richards equipment can do for you.

J.A. Richards Company

NORTH PITCHER STREET • KALAMAZOO, MICHIGAN

CIRCLE INFORM-A-GRAM KEY NO. 1211

VIBRATION ?



. . . but not here!

Prevent harmful machine vibration with EMPCO Leveling Jacks and VI-SORB Mounting Pads

JACKS IN SIX STYLES, 25 MODELS. PADS TO FIT.

To avoid excessive machine vibration, *set* them level, *keep* them level, with EMPCO Leveling Jacks! Easy to install, EMPCO Jacks provide a solid, easily adjustable foundation for machine tools, large surface plates, automation lines, tool room and production equipment of all types. Used with VI-SORB Mounting Pads, they further reduce objectionable vibration, retard creepage and often eliminate the need for anchor bolts.

INQUIRE TODAY ASK FOR BULLETIN NO. 100

EMPCO LEVELING JACKS

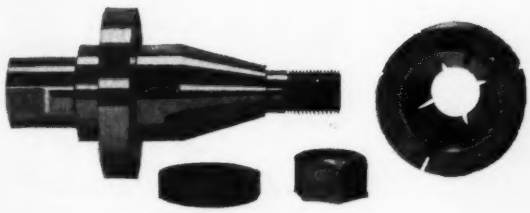
THE ENTERPRISE MACHINE PARTS CORPORATION

2735 JEROME AVENUE • DETROIT 12, MICHIGAN

Manufacturers of Automatic Production Machines, Fixtures, Machine Parts

CIRCLE INFORM-A-GRAM KEY NO. 1213

NEW CHAMPION ®



high production expanding mandrel

"Lok-Tite" series expanding mandrels with quick-taper design give automatic release of workpiece. They are used between centers, chucked, face plate or rotary table mounted. Threaded nut or drawbar clamped. Precision of .0004" T.I.R. is guaranteed. Twelve arbors with a wide range of sleeves will handle all holes from ½" to 15" I.D.

Send for free catalog giving complete line, specifications and prices

THE WESTERN TOOL & MANUFACTURING CO., INC.
SPRINGFIELD, OHIO FAIRFAX 3-9151

CIRCLE INFORM-A-GRAM KEY NO. 1212

NEW FLOOR MODEL A-F

Wilder MICRO-PROJECTOR with VERTICAL LIGHT BEAM

Quality Control plus Cost Control

- Completely versatile. For production inspection or as contour measuring projector.
- Choice of 3 measuring stages 1" x 1", 2" x 2", 2" x 4".
- Full set of lenses between 10x and 100x magnification.
- Full length cabinet eliminates separate worktable.
- Detachable shelf optional.

Write for New 12 page catalog 357.

OPTO-METRIC TOOLS, INC.

137 TP Varick Street, New York 13, N.Y.

CIRCLE INFORM-A-GRAM KEY NO. 1214

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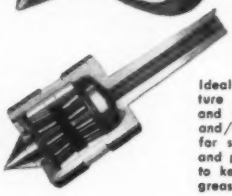
LIVE CENTERS

GUARANTEED TO MATCH OR EXCEED, "CRITICAL" JOB SPECIFICATIONS

In the GOLD BAND line Ideal has combined the latest production methods with their traditionally fine craftsmanship to bring you an unequalled standard of excellence in live centers. Accurate, (to ± .0001") GOLD BAND Live Centers offer "custom" quality at production prices. Specify GOLD BAND Live Centers and your every need can be accommodated from stock . . . 99 times out of 100. Ideal's GOLD BAND Live Centers offer savings, simplified operations and higher lathe output both in quantity and quality. Contact your distributor today...or



PRECISION FITTED BEARINGS

Ideal Live Centers feature precision machined and hardened ball and/or roller bearings for superior accuracy and performance. Sealed to keep dirt out, grease in.

A COMPLETE LINE FOR EVERY NEED...SPECIALS, TOO!

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CIRCLE INFORM-A-GRAM KEY NO. 1221

STANDARD
PORT CONTOUR CUTTERS
Stocked for Immediate Shipment

Combines 5 Operations in One
All Tolerances Well Within AND 10050—MS-33514—MS-35515 Specifications

A complete line of combination ream, counterbore and facing tools to form AND-10050 standards. Tube size 2 thru 32 carried in stock. Also tools for MS-33514 and MS-35515 carried in stock sizes 2 thru 20. Special tools made to order.

WETMORE TOOL & ENGINEERING CO.
5320 E. Washington Blvd.,
Los Angeles 22, Calif.
AN 9-7266

CIRCLE INFORM-A-GRAM KEY NO. 1223

Brinell Test
large pieces fast—with this long stroke machine

Large awkward castings, forgings or pipe are easily tested because the long stroke eliminates screw adjustment to work size. The hydraulic ram is controlled by a single lever. Large, stationary roller-type or flat table makes work handling simple, fits well into a conveyor line.

Choice of plain Brinell machine or the direct reading machine (shown, model DHL), where dial at end of ram gives comparative hardness immediately. Larger and special machines may also be had.

Write for more information on all our Brinell testing machines.

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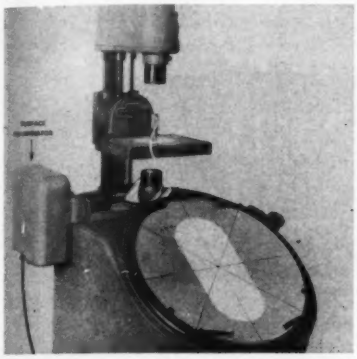
Q-C and Inspection

PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS & PROCESSES & PRODUCTS

"Industrial Optical Aids" presents descriptions and dimensions of microscopes and comparators. Among its features is an explanation of the pocket-size instrument surface comparator used for checking surface quality right in the plant. Get Catalog D-1059 from Bausch & Lomb Optical Co., 635 St. Paul St., Rochester 2, N. Y., or — **Circle A89**

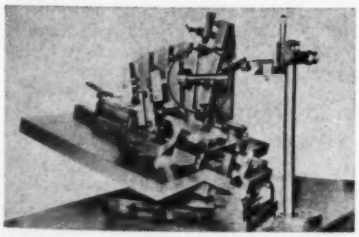
The New Surface Illuminator, featured on the George Scheer Micro-Projector can be used for all standard magnifications requiring



projection by reflected light. Adjustable mirrors permit the use of the unit for all magnifications from 10X to 100X. George Scheer Co., 200 Lafayette St., New York, or— **A90**

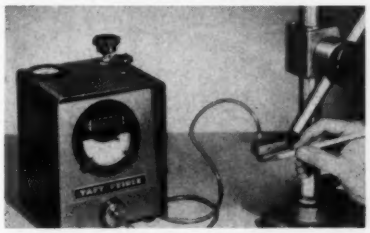
Hints on Quick Internal Visual Inspection of blind rivets, extrusions, bores, forgings, castings, and machined parts using the Lenox precision-made borescopes are discussed in a bulletin. Descriptions of the three interchangeable viewing heads are given. Get this folder from Lenox Instrument Co., 2012 Chancellor St., Philadelphia 3, or— **Circle Inform-A-Gram No. A91**

For Hard-To-Reach Inspection of tooling or parts, use the new small cylinder square. It checks squareness, parallelism, concentricity, and



runout of component parts, shafts, spindles, and bores. Setup time is cut because it's held to the work piece with powerful magnets. AA Gage Co., 350 Fair St., Detroit 20, or— **Circle Inform-A-Gram No. A92**

This New Air Gaging Capsule increases scope, improves accuracy, and reduces cost of many types of inspection jobs requiring high magnification gaging equipment. It's



used with any CompAIRator air gage to provide fast visual readout with quick response. Taft-Peirce Mfg. Co., Woonsocket, R.I., or— **Circle Inform-A-Gram No. A93**

A Versatile Photo-Sensitive Chart Material for ultra-accurate projection gaging makes possible tighter tolerances, improved accuracy, and lower inspection costs. Translucent Plates, Type 5, are used with optical comparators and also profile grinders. Special Sensitized Products Sales, Eastman Kodak Co., Rochester 4, N. Y., or — **Circle A94**

A New 114-Page Catalog, "Optical Projection, The Key to Improved Gaging Technique," contains information on optical gaging, chart-gages, and fixturing. Detailed diagrams and specifications are given for chart layout materials, standard chart-gages, micro-gage chart-gages, and standard accessories. Get your copy of Catalog 10 from Optical Gaging Products Inc., 26 Forbes St., Rochester 11, N.Y., or— **Circle Inform-A-Gram No. A95**

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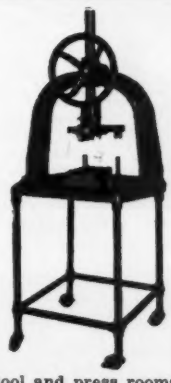

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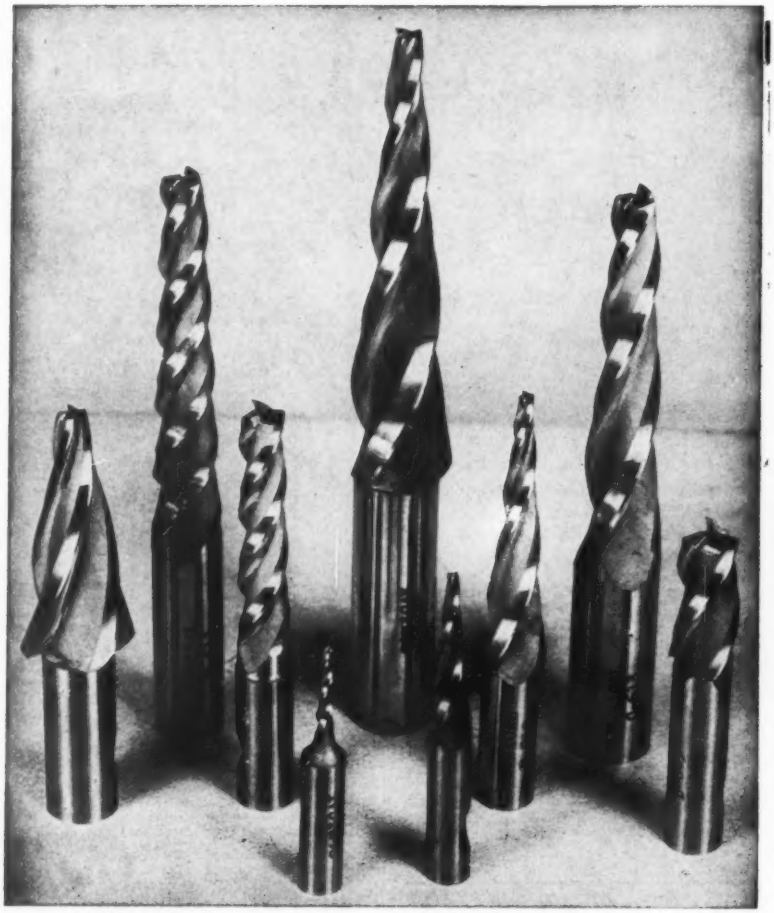

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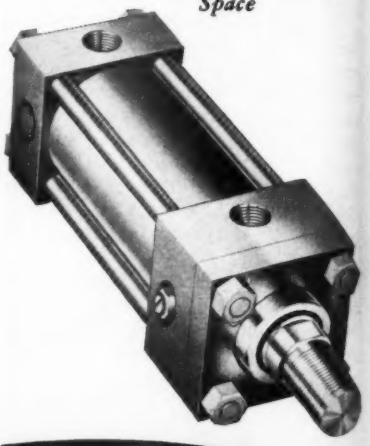

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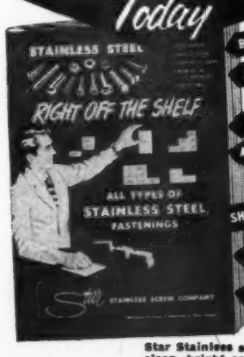

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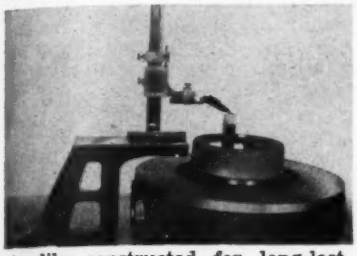
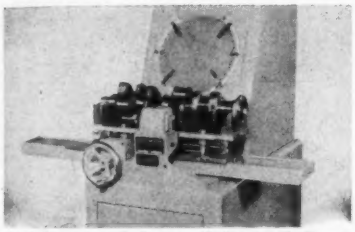
An Extension Height Block permits both height and reach measurements in inspection, layout, and prototype operations. The block is a one-piece Meehanite casting



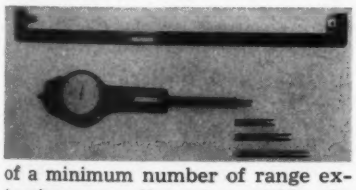
sturdily constructed for long-lasting accuracy, yet is lightweight. Get information on the standard 10" model from Machine Products Corp., 6771 McNichols Rd., Detroit 12, or — **Circle No. A96**

This Optical Comparator, Model 14, is arranged with a special fixture for checking the fillets in crankshaft bearings. The workholding fixture is mounted on a supporting table



and is moved from right to left on ways through a rack and pinion to obtain clear images. Covel Mfg. Co., Benton Harbor, Mich., or— **A97**

Check Large Internal Diameters with this kit introduced by Boice Gages, Inc., Hyde Park, N.Y. It contains an adjustable dial pin gage and master with 6" range. With the use



of a minimum number of range extensions, any dimension within the gage's range can be set in minutes. For details write the company, or— **Circle Inform-A-Gram No. A98**

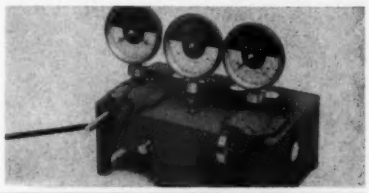
An Improved Eccentricity Indicator, The Eccentricator, is a spindle-actuated precision-switching mechanism which indicates eccentricity, run-out, lack of squareness, or wobble when combined with signal lights. No computing is necessary on Model A-93 because variations are indicated directly. It can be used for either automatic or manual inspection. Federal Products Corp., Providence, or— **Circle Inform-A-Gram No. A99**

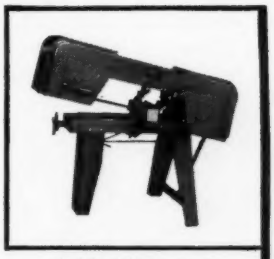
Check Clearances between the ID and OD of mating parts to millionths with the Air-O-Limit 3-station ID-OD clearance comparator introduced by Pratt & Whitney Co.,

Q-C and Inspection

PRODUCTS & PROCESSES & PRODUCTS

Inc. It checks precision mechanisms such as servo valves, computes the clearance, and quickly indicates this on a dial. For information, write to Pratt & Whitney Co., Inc., W. Hartford 1, Conn., or— **Circle No. A100**





Model B (Wet or Dry) Dependable. Economical. Easily handles 5" rounds, 10" flats.

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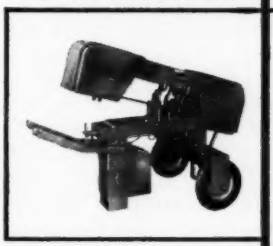
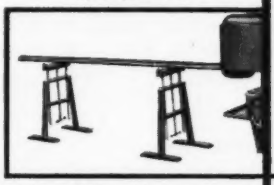


Model M (Mobile). Rolls to the job, inside or out. Capacity: 5" x 10"



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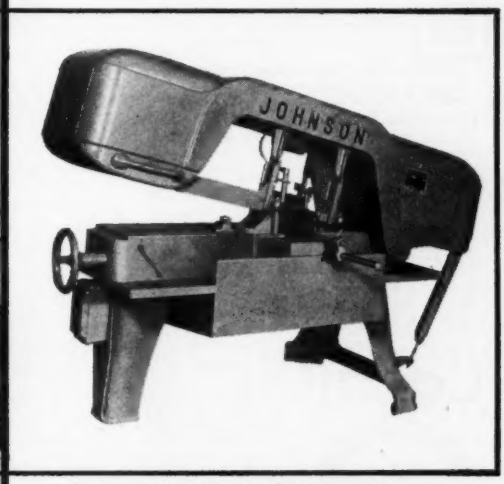

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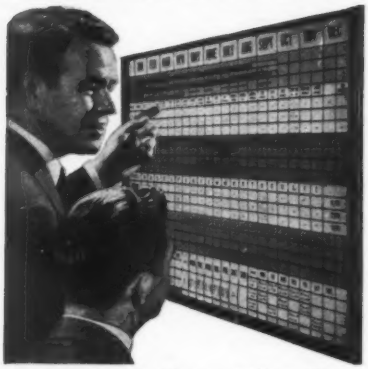

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Pressworking

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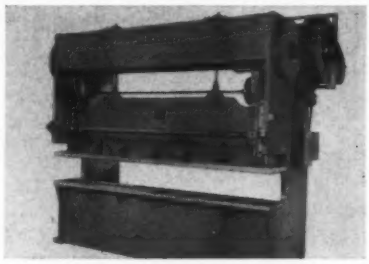
"Five Money Saving Accessories for your Plant," each designed for a specific need, are described and dimensions are given in this bulletin. Die set separators, Acro leader pin oilers, drill rod racks, wing nuts, and Acroflex formative steel strapping, are the items featured. Acro Metal Stamping Co., 332 E. Reservoir Ave., Milwaukee 12, or — **Circle Inform-A-Gram No. A101**

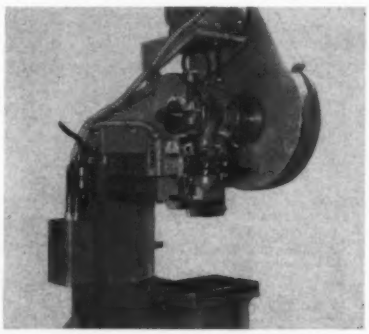
A Gang Punching Machine features light tonnage and large bed and ram area. It provides 60-ton capacity and 126" between housings. Other dimensions include 4" stroke; 4" ram



adjustment; 14" shut height, bed to ram; and 45 strokes/min operating speed. Verson Allsteel Press Co., 9300 S. Kenwood Ave., Chicago 19, or — **Circle No. A102**

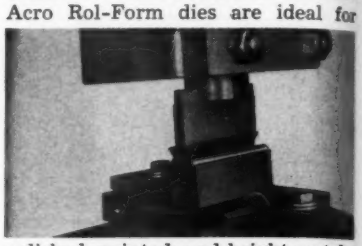
Steelweld Hydraulic Press Brakes are described and illustrated in a catalog which discusses the specifications, advantages, and features of several models. Construction details are also given in Catalog 2024A from The Cleveland Crane & Engineering Co., Wickliffe, Ohio, or — **Circle No. A103**

High Speed Punching, cutting, and forming operations can be performed on the new 7-ton deep-throat bench press introduced by E. W. Bliss Co., 1375 Raff Rd., N.W., Can-



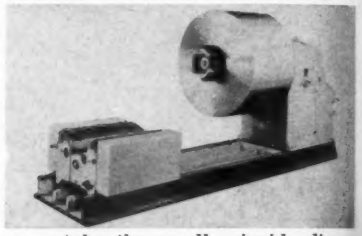
ton, Ohio. The rugged 018-DT has a 1½" standard stroke and a 14" throat depth. For details, write to the company, or **Circle No. A104**

Reduce Die Setup and changeover time and eliminate work marking with the new type female press brake die with roll inserts. The Di-Acro Rol-Form dies are ideal for



polished, painted, and bright metals, and can be used in any mechanical or hydraulic press brakes or punch presses. O'Neil-Irwin Mfg. Co., 626 8th Ave., Lake City, Minn., or— **Circle Inform-A-Gram No. A105**

Load and Unreel Heavy Coils of steel stock and tin plate weighing up to 15,000 lbs with this reel and loading combination. The collapsed



arms take the smaller inside diameters of 16" to 17", to 54" OD, and up to 36" wide. For information, write F. J. Littell Machine Co., 4101 N. Ravenswood Ave., Chicago 13, or— **Circle Inform-A-Gram No. A106**

"More For Your Short Run Stamping Dollar" is a bulletin which tells of facilities and services, and when and why you should use Federal controlled tolerance short run stampings. Design tips for greater stamping economy are also presented. Get Bulletin 301 from Federal Tool & Mfg. Co., 3600 Alabama Ave., Minneapolis 16, or— **Circle Inform-A-Gram No. A107**

Heavy-Duty, Solid-Head Type Punches are now available from Ring Punch & Die, Inc., 13 Fenton Pl., Jamestown, N.Y. They come in two grades of high quality tool steels and can be supplied with round,

square, oblong, or rectangular points. Odd shapes can also be furnished. Write to the company for more information, or— **Circle A108**

DAD? You said you were coming home early. All the other kids' fathers are home. Why don't you use Threadwell cutting tools like they do? That's what Mommy told me to say. Grandpa is a Threadwell Distributor, you know. *Photo by Cobb Shinn for Threadwell Tap & Die Co., Greenfield, Mass.*

CIRCLE INFORM-A-GRAM KEY NO. 1271

ME? . . . nah I don't work. I got sensitive hands. But me brudder Mike, he says work's a snap when you get hold of Threadwell cutting tools from your Threadwell Distributor. Mike swears by 'em. If somebody gives me a job you can bet I'll use Threadwell . . . I don't want to ruin me hands, you know. *Photo by Cobb Shinn for Threadwell Tap & Die Co., Greenfield, Mass.*

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DADDY . . . diamonds can be a man's best friend when they're mounted in a Threadwell Tangi-matic dresser. You can dress grinding wheels quickly and accurately with this direct reading dresser. With all the time you'll save you can spend more time down here with me. See your Threadwell Distributor now, just for me, huh. *Photo by Peter Gowland for Threadwell Tap & Die Company, Greenfield, Mass.*

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NEW LOW COST LEAD SCREW TAPPER

with . . .

PUSH BUTTON

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- **Eliminates parts spoilage, inspection.**
- **Saves Taps, Reduces Fixture Costs.**
- **Fast, Economical, 6-way Operating Action.**

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Push button releases electrically controlled air pressure engaging sensitive friction clutch which actuates lead screw. The tap, completely controlled by lead screw, is fed gently, automatically without pressure. The result is repetitive uniformity and precision that never varies! Tests proved all tapped parts passed 100% inspection—without rejects!

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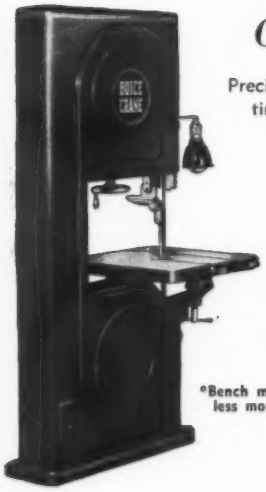

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NEVER SEND A BOY—here's the Knu-Vise clamp AO-200.

LAPEER CLAMPS FOR ARC WELDING

In the plant of a midwestern automotive parts manufacturer, air operated Knu-Vise clamps are an important part of a work holding fixture for arc welding. Shown is the operation where center hubs are welded into the high clutch splitter housing for automatic truck transmissions.

No job for a panty-waist, the husky Lapeer clamps have to grab securely—hold rigidly—let go instantly. They are part of a family of more than 150 models of clamps and pliers designed to do a tremendous number of holding jobs. Some are air-operated, others hand operated. All of them do workhorse jobs in industry holding big parts, small parts, unwieldy parts. Write today for more information.

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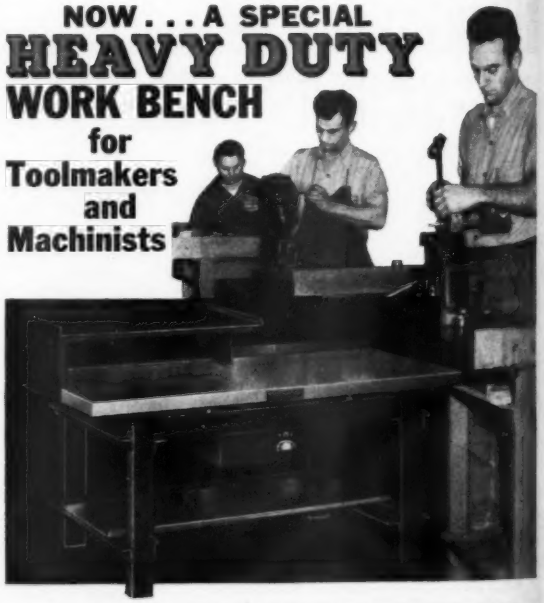

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Pressworking
PRODUCTS & PROCESSES & PRODUCTS

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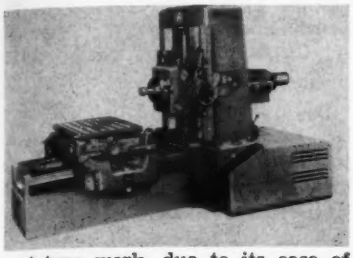

prototype work, due to its ease of operation and versatility. M. B. I. Export & Import Ltd., A Div'n of Machinery Builders, Inc., 475 Grand Concourse, Bronx 51, N. Y., or —

Circle Inform--A-Gram No. A109

This New Back-Geared Benchmaster Press delivers 8 tons of pressure and punches to the center of a 24" circle. Dimensions include 8" x 11" bed area 1¼" standard stroke, and 1½" ram adjustment. Benchmaster Mfg. Co., 1835 W. Rosecrans Ave., Gardena, Calif., or —

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Circle Inform-A-Gram No. A111

An Automatic Press Control for large-size punch presses and smaller presses of the hydraulic or air-clutch type, is described in a catalog. It stops when something goes wrong or if the operator's hands are in the way of the ram. Sizes, specifications, and applications are given of Model 87-A in a catalog available from W. I. Martin and Co., 3059 W. Armitage Ave., Chicago 47, or—

Circle Inform-A-Gram No. A112

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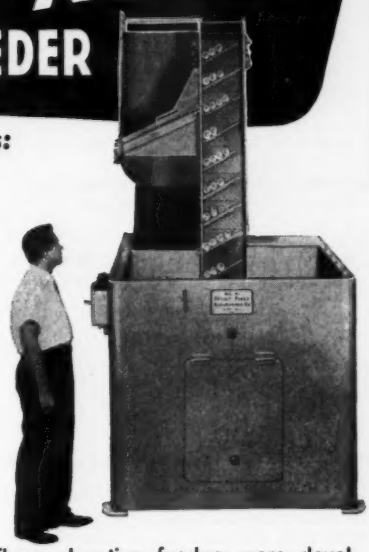

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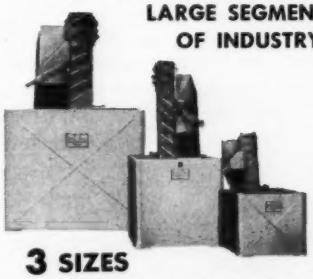

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(20-12-6 cubic feet load capacities)
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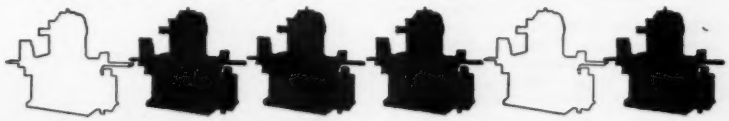

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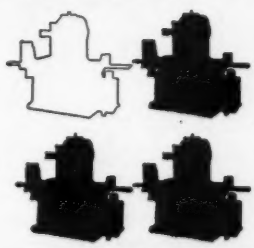

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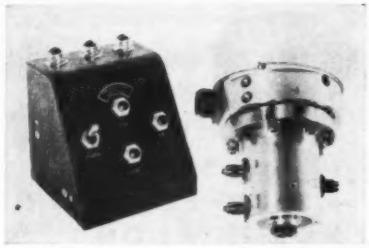
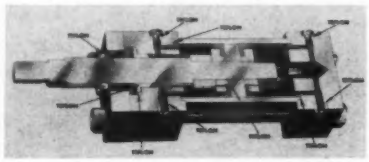


permits infinitely variable pressure over a wide range to be loaded or vented with speed and sensitivity. Marotta Valve Corp., P. O. Box 330-79, Boonton, N. J., or —

Circle Inform-A-Gram No. A113

For Greater Safety use these hydraulic cylinders that feature Teflon seals to prevent external leakage. Teflon seals withstand heat up to 450°F and aren't destroyed by



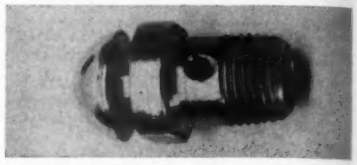
the chemicals in non-inflammable hydraulic fluids. For more information, write Miller Fluid Power Div'n, Flick-Reedy Corp., 2040 N. Hawthorne Ave., Melrose Park, Ill., or—

Circle Inform-A-Gram No. A114

Remove Carbon and eliminate carbon build-up on all valves and rings using the Hydrodyne-Ac, a liquid fed into air compressor air intake lines by a drip feed lubricator. It emulsifies the carbon, prevents it from hardening on the valves, and removes it. Get information from Aquadyne Corp., 87 Terminal Ave., Clark, N. J., or —

Circle Inform-A-Gram No. A115

Use This New Poppet Valve as a pneumatic control circuit component or in applications where bleed control is required. Model

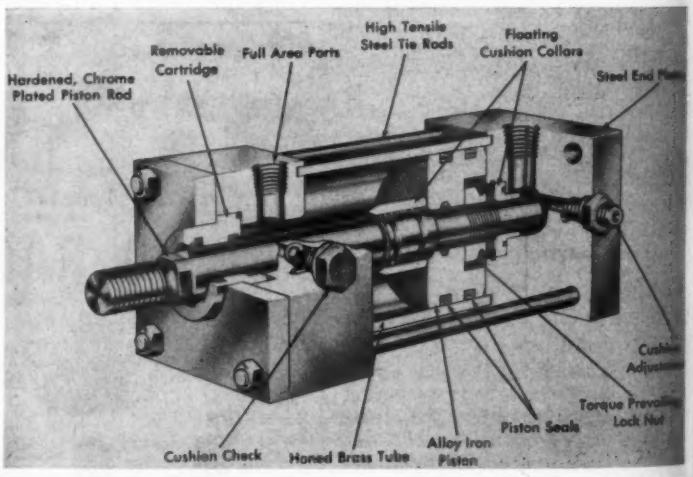


V8B-2 operates on pressures from 0 to 150 psi and has an effective orifice area of 3/32" dia. Hause Machines, Inc., Montpelier, Ohio, or—

Circle Inform-A-Gram No. A116

The Revised Edition of "Circuit Rider" is a 28-page booklet published by Logansport Machine Co., Inc., Logansport, Ind., which discusses the basic fluid circuit designs. Information is included for circuits covering sequencing, semi-automatic and automatic cycling, safety systems, and dual pressure systems. Get a copy from the company, or—

Circle Inform-A-Gram No. A117



Interchange These Cylinders to use with air, oil, or water at pressures up to 200 psi air and 500 psi oil or water. These Series A cylinders feature floating metallic cushions for uniform cushioning and wear prevention, and are available in 21 models. The S-P Mfg. Corp., 30201 Aurora Rd., Solon, Ohio, or—

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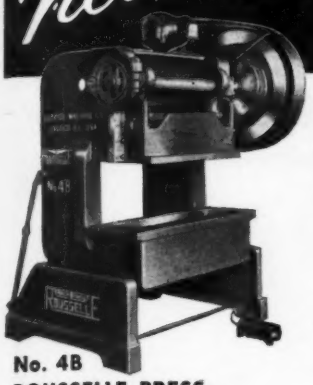
New 40-TON DOUBLE CRANK O. B. I.
ROUSSELLE



WITH NEW ELECTRICALLY CONTROLLED AIR CLUTCH

- "Plug-in" foot and hand controls.
- Single stroke, continuous and jog selector.
- Low air consumption.
- Large die area.
- Roller bearing flywheel.
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No. 4B
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CHOICE OF 30 SIZES AND TYPES IN 5 TO 40-TON PRESSES

SERVICE MACHINE CO.
Mfrs. of Rousselle Presses
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ROUSSELLE PRESSES ARE SOLD EXCLUSIVELY THROUGH LEADING MACHINERY DEALERS

CIRCLE INFORM-A-GRAM KEY NO. 1311

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REID TOOL SUPPLY CO. Muskegon Heights, Mich.

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FAST • SAFE • BETTER
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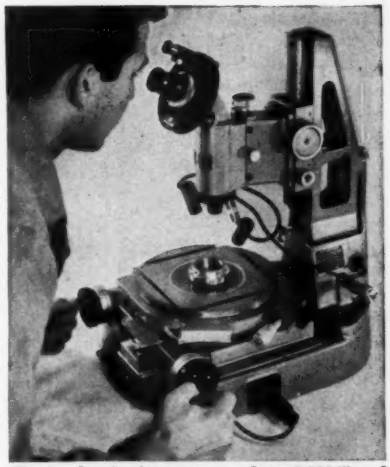

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High precision, low cost instrument for 2-dimensional linear measurement. Range 2" x 2", reading to 0.0001".

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Reliable, low cost instrument for linear measurement. Ranges up to 4", reading to 0.0001" or 0.00005".

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High quality, low cost instrument with range up to 0.100". Reading to 0.001", easy interpolation to 0.0002".

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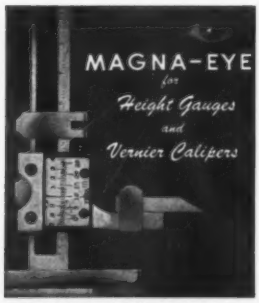

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Made in 3 sizes to fit Starrett, Brown & Sharpe, Lufkin Tools, and others of similar design. S No. 100 for 6" Vernier Calipers; S No. 200 for 10"-12" Height Gages, also 10"-18"-24" Vernier Calipers; S No. 300 for most popular type 18" and 24" Height Gages and for 36"-48" 60" and 72" Calipers.
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Convert your lathes for turret work this quick, easy way. ENCO HEXTURRET gives you the *accuracy*, *rigidity* and *speed* you need to step up lathe production and cut "per piece" costs. Easy as mounting your lathe tailstock. Does both normal and heavy lathe and screw machine work, drilling, counter boring, counter sinking, spot facing, reaming, turning, boring, etc. Fit all lathes 9" to 16" swing.

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Please send catalog #53 and full details of ENCO HEXTURRETS.

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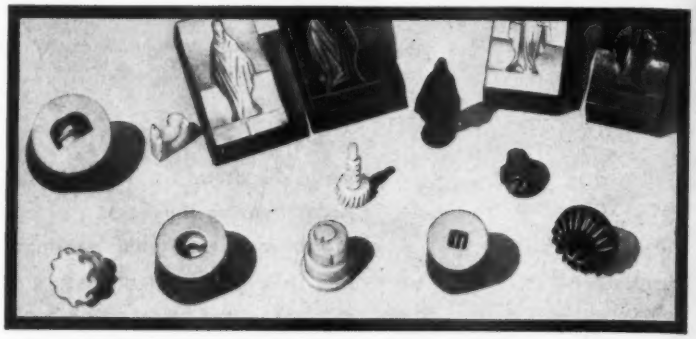

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Men would not accept either idea at first...

INSERT CHASERS SAVE UP TO 33%

Insert chasers are like safety razor blades: they cost so little that you can throw them away when dull. Or, for utmost economy, you can resharpen them over and over again. Only a flash grind is required. For less than $50 you get a dozen sets of ¾—16 insert chasers, each set ground ready to go. You will be amazed at the quantity of threads they will cut, even to Class 3 specifications, with a minimum of downtime.
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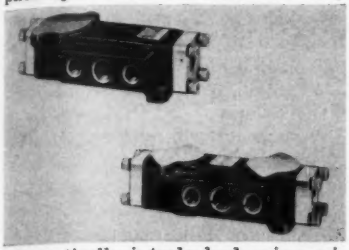
Pneumatics & Hydraulics

PRODUCTS & PROCESSES & PRODUCTS

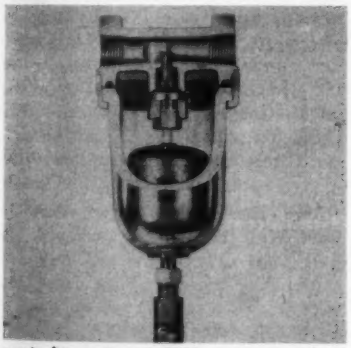
Use These ¼" 4-Way foot-mounted control valves in hazardous locations and wherever remote pilot operation is desired on any



pneumatically-interlocked circuitry. Cutaways show straight-through construction for maximum flow and easy maintenance. Valvair Corp., 454 Morgan Ave., Akron 11, Ohio, or — **Circle Inform-A-Gram No. A119**

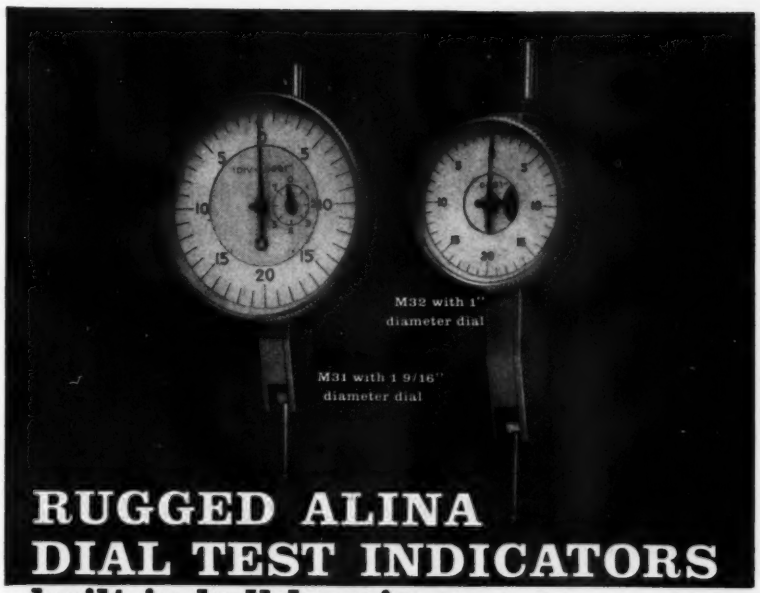
Low Turning Torque for easy fluid valving under high operating pressures is a feature of the Sphe-rotor control valve described in a bulletin. Dimensions and detailed drawings are included for this four-way, open or closed center-directional control valve. For a bulletin, write Sarasota Precision Products Inc., 1314 Lime Ave., Sarasota, Fla., or—**Circle Inform-A-Gram No. A120**

An Automatic Filling Lubricator for use with pneumatic equipment saves hand-filling and doesn't hold up production because the lubricant is piped directly from a 55-gal drum to a number of units. To con-



vert from hand-filling types, just get the new bowl with sensing valve for continuous lubrication. Arrow Tools, Inc., 1928 S. Kostner Ave., Chicago 23, or — **Circle A121**

Minimize Maintenance using the improved Class 1 and 2 air and low-pressure hydraulic cylinders with the new Lock-Gland feature, which positively locks the gland in place and maintains proper packing compression. For details, write Galland-Henning Nopak Div'n, 2782 S. 31st St., Milwaukee, Wis., or — **A122**



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built-in ball bearings

for greater sensitivity—reduced pressure—improved accuracy

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Available with a wide variety of rectangular or round shanks.

The instruments shown here are part of a complete line of precision DIAL TEST INDICATORS of all types — Write for brochure!

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CIRCLE INFORM-A-GRAM KEY NO. 1331

Four Piece Assemblies at 600 per Hour With Kenco 15-Ton Electro-Safe Punch Presses

These two Kenco Presses each assemble four parts of electric irons at the rate of 600 components per hour at General Electric Company, Ontario, California. A third Kenco on the line assembles these components with a top plate. Parts are fed to the operators through hopper bins and assembled parts are carried away on a belt conveyer.

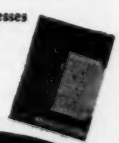
Kenco Electro-Safe Presses are used because of their unprecedented safety features and their ability to stay on the job — for maximum production. The press has no flywheel — in single stroke operation the press and motor go dead, eliminating double-tripping and stored-energy hazards. The operator must hold two widely spaced controls depressed to single trip the machine. A locking dial permits changing from "single trip" to "continuous trip" or "inching".

The Electro-Safe control can be connected to the die area to stop the ram on the downward stroke should any irregular feeding occur, thus protecting both the part and the die set. In addition, extra long ram guides keep perfect alignment which results in long die life, and many other exclusive features to keep them on the job.

You too can increase production with Kenco Presses — and at the same time increase profits. Can we give you additional information?

JOB FACTS:

Company: General Electric Co., Ontario, California
Machines: 3 Kenco 15-Ton Electro-Safe Punch Presses
Job: Assembling 4 Parts each for electric irons
Shifts: Up to 3 for 9 months.
Maintenance: Brake relined. Considerable Brake Failure
Production: 600 assemblies per hour
Remarks: "The presses are extra safe" and "Dies last longer".



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KENCO MANUFACTURING CO

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Assembly

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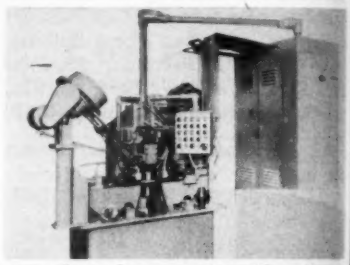
Circle Inform-A-Gram No. A123

A Precision Square Nut catalog page has been released by National Machine Products Co., Utica, Mich. These nuts are double chamfered and double countersunk to allow either end to be used as a seating face. Other features and dimensions are found in the catalog, or — **Circle Inform No. A124**

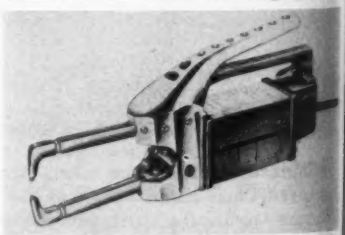
A Hydraulically-Operated, semi-automatic combination press and stake machine features electrical controls, hydraulic pump, reservoir, and valves on one control console. This machine presses and stakes six



cup plugs in an automotive transmission front pump stator support. The plugs are hopper fed into position, and if they are not properly fed, the machine will not stake the part. Gray Equipment Co., 13600 Ford Rd., Dearborn, Mich., or—

Circle Inform-A-Gram No. A125

The New Rex Junior Portable Spot Welder features a fixed top tong that saves time and labor because the operator can rest the welder on the exact welding spot for



added contact pressure. Ideal for small sheet metal shops and maintenance work, it can be used on mild steel, stainless, galvanized iron, and terneplate. Peer, Inc., Benton Harbor, Mich., or — **Circle A126**

Join Metals up to ¼" thick in any regular configuration from flat sheet to cones or cylinders up to 30" OD, with this new medium-hold-down-pressure longitudinal

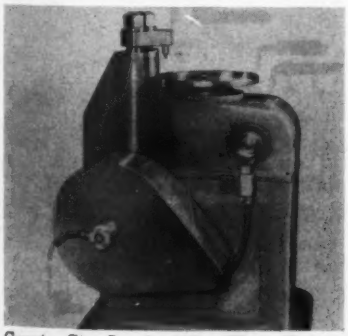
welding positioner. Model LW10020 has a 10' welding length with a 30" total working height. Airline Welding and Engineering, 785 N. Prairie Ave., Hawthorne, Calif.

Circle Inform-A-Gram No. A127

A Long Stroke Riveting Machine has been designed to handle and set long tabular and semi-tabular

type rivets in fabricated or molded metal or plastic. Model 423 sets rivets up to ¼" dia and 2⅜" long. The Milford Rivet & Machine Co., Milford, Conn., or — **Circle A128**

A High Speed, Precision Index Table, integrated with a dieing machine type press, has been introduced by Ferguson Machine Corp. of Indiana, 7818 Maplewood Industrial



Court, St. Louis 17. The Pressembler is for automatic assembly operations that include a press function such as crimping or riveting, or for dial-fed secondary press operations in making small parts.

Circle Inform-A-Gram No. A129

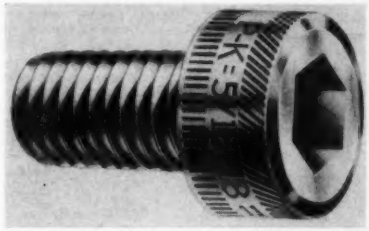
A Nickel Coated Titanium Wire is a special purpose wire for use as a material for ceramic to metal brazing. The alloy, which melts to bond with the ceramic, is applicable as a sealing material for ceramic base vacuum tubes. Little Falls Alloys, Inc., 189 Caldwell Ave., Patterson, N. J., or —

Circle Inform-A-Gram No. A130

This Assembly Tool, Model U powered screwdriver, is discussed in a bulletin which gives dimensional drawings and explains the features and advantages. It is available from Detroit Power Screwdriver Co., 2801 W. Fort St., Detroit 16, or —

Circle Inform-A-Gram No. A131

Eliminate Indentation under high tensile load with this new socket head cap screw which features more wrenching area and an enlarged



bearing surface. The Pre-Lode screws are available in standard sizes from ¼" to 1". Parker-Kalon Div'n, General American Transportation Corp., Clifton, N.J., or—

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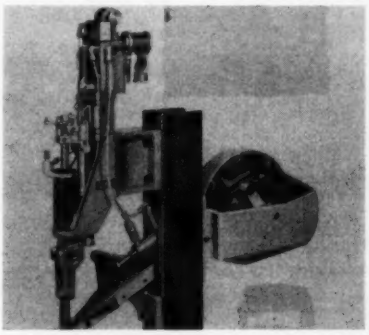
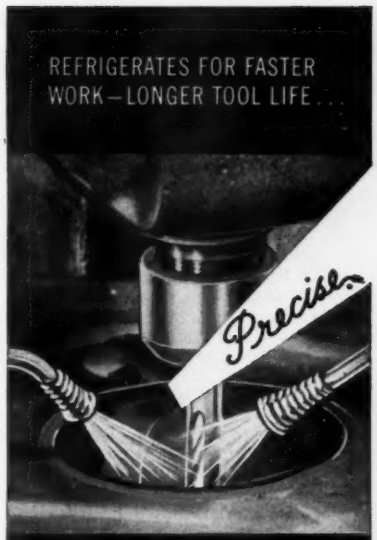
This Improved Dixon Auto-Positioner, with positioning head and parts feeder on a rigid dual column, handles workpieces from 1/16" to 2". It's easily adapted to many types of



machines, fixtures, and tables, and if a part is missing or malformed, the sensing mechanism causes machine to stop. Dixon Automatic Tool, Inc., 2300 23rd Ave., Rockford, Ill., or — **Circle Inform-A-Gram No. A133**



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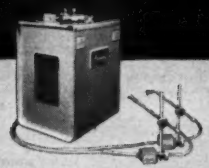

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SUBJECT INDEX

Abrasives
Belt grinders, application of, Sept. p. 24 (1¾ pp)
Coated, performance factors of Jan. p. 87 (4 pp)

Adhesives
Bonding, for carbide tip attaching to steel, Apr. p. 83.

Air Power
Valves for press safety, July, p. 42 (2¾ pp)

Alloys, high temperature, formed by high-impact-spin technique, Jan. p. 78 (4 pp)

Assembly (also see Welding, etc.)
Facilities for stamped components, Apr. p. 87 (4 pp)

ASTE Tool Show
Technical Conferences, Apr. p. 96 (2½ pp)
Toof show previews, Apr. p. 100 (8 pp)

Automation line, tape controlled, Apr. p. 94 (2 pp)

Bearings
Bushings, pilot, live roller, Mar. p. 65 (3 pp)
Inventory, reduction of, Mar. p. 73 (1½ pp)
Life, improvement of, Mar. p. 74 (¾ pp)
Sliding, behavior of, July, p. 38 (4 pp)

Belt grinders
Applications of, Sept. p. 24 (1¾ pp)

Bending
Tubing, cold bending vs hot bending, July, p. 48 (3 pp)

Boring
Heavy parts, setup for, Apr. p. 71 (4 pp)
Jig, horizontal, Mar. p. 57 (4 pp)

Brazing
Carbide tip attachment to steel by, Apr. p. 85
Honeycomb fabrication by, Jan. p. 73 (4½ pp)

Bushings, pilot, live roller, Mar. p. 65 (3 pp)

Carbide
Dies, for stamping 33" x 39" magnet laminations, Aug. p. 40 (3 pp)
Drills, application and maintenance of, Apr. p. 75 (5 pp)
Milling steel on low-horsepower machines, Feb. p. 83 (5 pp)
Pilot bushings for improved life, Mar. p. 65 (3 pp)
Spray, hard surfacing by, Sept. p. 63 (2/3 pp)
Throwaway insert standards, Feb. p. 79 (2½ pp)
Tips, methods for attaching to steel shanks, Apr. p. 83 (4 pp)
Tools, diamond grinding wheels for, Feb. p. 67 (12 pp)
Tools, new cutting materials for, Feb. p. 88 (5 pp)
Tooling, throwaway insert control, Feb p. 79 (2½ pp)

Coated abrasives, performance factors of, Jan. p. 87 (4 pp)

Cold forming
Cold bending tubing vs hot bending, July, p. 48 (3 pp)
High temperature alloys, Jan. p. 78 (4 pp)
Importance to Industry, Apr. p. 8 (2 pp)
Splines by low pressure rolling, June, p. 52 (1 p)

Computer
Inventory control by, Oct. p. 69 (3 pp)

Contours
Intricate, optical inspection of, July, p. 45 (1 p)
Projector for production and inspection, Mar., p. 75 (2 pp)

Contouring, numerical control, vs. tracer control, Jan. p. 72 (½ p)

Control
Centralized, by production monitoring system, June, p. 45 (2 pp)
Electronic, for grinding needle bearings, Apr. p. 91 (2 pp)
Numerical, application of, Mar., p. 84 (1 p)
Tape, for multi-station job-lot automation, Apr. p. 95 (2 pp)
Tracer vs. numerical control, Jan. p. 72 (½ p)

Conveyor, roller, use of, Apr. p. 71 (4 pp)

Coolants for diamond wheels, Feb. p. 67 (12 pp)

Cost cutting
Automatic finishing equipment for, Oct. p. 74. (2½ pp)
Automatic programming for turret lathes, June, p. 49 (2 pp)
Electronic inventory control for, Oct. p. 69 (3 pp)
Parts identification, rubber stamps vs silk screen, June, p. 37 (3½ pp)
Plant-wise production control, for, June, p. 45 (2 pp)
Univac integrates order processing, June, p. 123 (½ p)
Work simplification program for, Oct. p. 72 (2 pp)

Cutting tools
Carbide drills, sharpening of, Apr. p. 75 (5 pp)
Carbide insert milling cutters for low-horsepower machines, Feb. p. 83 (5 pp)
Drills, twist, grinding of, Oct. p. 59 (6½ pp)
Gun drill applications, Jan. p. 67 (5¼ pp)
Materials, metallurgy of, Feb. p. 88 (5 pp)
Milling cutters, determining approach and runout of, Apr. p. 80 (3 pp)

Design clinic
Milling cutter for blind hole keyways, June, p. 41 (3¼ pp)
Spline gage, design of, Sept. p. 64 (2 2/3 pp)

Diamonds, special report, use and conservation of, Feb. p. 67 (12 pp); correction of, Mar. p. 69 (1 p)

Dies
Carbide, for stamping 33" x 39" magnet laminations, Aug. p. 40 (3 pp)
Electrical discharge machining technique for, Sept. p. 88 (1 p)
Progressive and transfer for high production, May, p. 66 (2¾ pp)
Progressive, 11-station, for cut and carry operation, Sept. p. 67, (3½ pp)
Progressive, for dieing machines, July, p. 46 (2 pp)

Dividing head, for measuring, 1/10th sec of arc, June, p. 51 (1 p)

Drilling, gun, application of, Jan. p. 67 (5¼ pp)

Drills
Carbide twist, application and maintenance of, Apr. p. 75 (5 pp)
Radial, for heavy work boring, Apr. p. 71 (4 pp)
Twist, grinding of, Oct. p. 59 (6½ pp)

Electrolytic grinding
Rocket engines, of, Oct. p. 53 (3 pp)

Electronic
Inventory control cuts costs, Oct. p. 69 (3 pp)
Machine, future application of, Mar. p. 51 (1 p)

Extruding metals, four methods for, Apr. p. 8 (2 pp)

Feeds and speeds for diamond wheels, Feb. p. 67 (12 pp)

Finishing
Painted parts, automatic equipment for, Oct. p. 74 (2½ pp)

Flatness, surface plates, measurement of, May, p. 69 (4½ pp)

Friction, sliding, affecting elements of, July, p. 38, (4 pp)

Fusion: a carbide tip attachment method, Apr. p. 86.

Gage blocks, creation, development, manufacture of, May, p. 63 (3 pp)

Gages
Automatic, for in-process control, May, p. 57 (5 pp)
Electronic, caliper for measuring in millionths, June, p. 47 (2 pp)
Gun Drill, construction of, Jan. p. 67 (5¼ pp)

Grinding and finishing
Angular grinding on surface grinders, Feb. p. 82 (1 p)
Belt grinders, application of, Sept. p. 24 (1¾ pp)
Control, continuous grinding, Apr. p. 91 (2 pp)
Diamond wheels for, Feb. p. 67 (12 pp)
Electrolytic method, by, Sept. p. 47 (1 p)
Finish, checking smoothness of, Mar. p. 56 (1 p)
Gear grinding, Crushtrue process for, Sept. p. 58 (2/3 p)
Grinders, drill, and various cutting tool configurations for, Oct. p. 59 (6½ pp)
Grinding rocket engines electrolytically, Oct. p. 53 (3 pp)
Gun drill cutting edges, Jan. p. 67 (5¼ pp)
Repetitive grinding to ±0.000010", June, p. 47 (2 pp)
Twist drills, carbide, Apr. p. 75 (5 pp)

Gun drilling, application of, Jan. p. 67 (5¼ pp)

Heat treating
Quenching media, magnetic heat extraction test for, Sept. p. 55 (3 1/3 pp)

Hole punching by grid layout, Jan. p. 110 (½ p)

Honeycomb sandwich structures, fabrication of, Jan. p. 73 (4½ pp)

Inspection
Contour projection for, Mar. p. 73 (1½ pp)
Data for determining machine capability, May, p. 51 (2½ pp)
Finish, checking smoothness of, Mar. p. 56 (1 p)
Hole center locator for, Oct. p. 58 (¾ pp)
Optical of intricate contours, July, p. 45 (1 p)

Interferometers, accurately measuring millionths with, May, p. 63 (3 pp)

Inventory
Bearings, reduction of, Mar. p. 73 (1½ pp)
Control, electronic, cuts costs, Oct. p. 69 (3 pp)

Jig boring, horizontal, Mar. p. 57 (4 pp)

Jigs and fixtures
Fixtures for checking U-bends and irregular contoured tubing assemblies, Sept. p. 170 (1 p)
Fixtures, trunnion, for heavy parts, Apr. p. 71 (4 pp)
Indexing fixtures for valve body production Sept. p. 59 (4½ pp)

Keyways
Blind hole, milling cutter for, June, p. 41 (3¼ pp)

Lathe
High precision headstock for, Jan. p. 82 (2 pp)
Turret, automatic programming for, June, p. 49 (2 pp)
Turret, indexing fixtures for valve body production, Sept. p. 59 (4½ pp)

Laminations
Magnets, carbide stamping die for, Aug. p. 40 (3 pp)
Plastic, glass base, machining of, Oct. p. 56 (2¼ pp)

Machines
Capabilities, determination of, May, p. 51 (2½ pp)
Obsolescence, guides to replacement, July, p. 9 (3½ pp)

Machine tools
Control techniques for cost cutting, Oct. p. 10 (2¼ pp)
New unveiling of, Aug. p. 48 (2 pp)
Obsolescence, current problems of, Oct. p. 10 (2¼ pp)
Replacement of, Feb. p. 65 (1 p)

Machining (also see specific process)
Cutting time computation, nomograph for, Aug. p. 43 (2 pp)
Electrical discharge process, Sept. p. 88 (1 pp)
Horizontal jig boring, Mar. p. 57 (4 pp)
Plastic, glass base laminate of, Oct. p. 56 (2¼ pp)

Magnets, large, construction of, Aug. p. 40 (3 pp)

Maintenance
Numerical control equipment, training for, July, p. 35 (3 pp)

Management
Big business tackles economic problems, Aug. p. 9 (2¾ pp)
Idle dollars, opportunities for, May, p. 49 (1 p)
Modernization, now a good time for, Sept. p. 51 (3½ pp)
Obsolescence, opportunity of, July, p. 9 (3½ pp)
Responsibilities delegated by, Mar. p. 53 (2½ pp)
Tomorrow's opportunities, planning for, May, p. 28 (1½ pp)
Training, effective pre-requisite for, June, p. 131 (2 pp)
Winning friends and influencing P.A.'s, June, p. 35 (1 p)

Materials
Cutting metals, evaluation of, June p. 23 (1¾ pp)
Cutting tools, metallurgy of, Feb. p. 88 (5 pp)
Extruding, savings by, Apr. p. 8 (2 pp)
Plastics, glass base laminate, machining of, Oct. p. 56 (2¼ pp)

Measurement methods
Measuring 1/10th sec. of arc, dividing head for, June, p. 51 (1 p)
Standards for, May, p. 63 (3 pp)

Metal Removal
Electrolytic grinding, by, Oct. p. 53 (3 pp)

Milling
Blind hole keyways, tooling for, June, p. 41 (3¼ pp)
Cutter approach and runout determination of, Apr. p. 80 (3 pp)
Cutters, carbide inserts for low-horsepower machines, Feb. p. 83 (5 pp)
Machines, live bearings for, Mar. p. 65 (3 pp)

Nomograph, for computing machine cutting time, Aug. p. 43 (2 pp)

Numerical Control
Application of, Mar. p. 84, (1 p)
Equipment maintenance, training for, July, p. 35 (3 pp)

Obsolescence
Equipment replacement, guides to, July, p. 9 (3½ pp)
Machine tools, current problems of, Oct. p. 10 (2¼ pp)

Parts identification, rubber stamps for, June, p. 37 (3½ pp)

Personnel
Maintenance training for numerical control, July, p. 35 (3 pp)

Planishing
Roll, for fusion welds, July, p. 122 (2 pp)
Plastics
Glass base laminate, machining of, Oct. p. 56 (2¼ pp)
Plastic tooling, increased use of, Mar. p. 70 (1½ pp)
Presses
Automatic for high production, Mar. p. 68 (1 p)
Automatic with transfer die, May. p. 66 (2¾ pp)
Hydraulic, for deep drawing, Sept. p. 80 (1¾ pp)
Safety, equipment for, July, p. 42 (2¾ pp)
Transfer, for deep drawing, Apr. p. 93 (1 p)
Production control
Plant-wise for cost cutting, June, p. 45 (2 pp)
Programming
Automatic, for turret lathes, June, p. 49 (2 pp)
Quality control
Automakers examine quality control results, May, p. 54 (1½ pp)
Automatic gaging for, May, p. 57 (5 pp)
Machine capabilities, determination of, May, p. 51 (2½ pp)
Planning and training for, May, p. 55 (½ p)
Quenching
Media, heat extraction, magnetic test for, Sept. p. 55 (3-1/3 pp)
Radial drill for heavy work boring, Apr. p. 71 (4 pp)
Research
Aeronautics laboratory for, Oct. p. 53 (3 pp)
Industrial, evaluation of, Jan. p. 8 (3 pp)
Safety
Grinding wheel flanges, torque wrench tightening of, Aug. p. 45 (3 pp)
Press, air clutch and brake for, July, p. 42 (2¾ pp)
Salvage
Diamonds, program for, Feb. p. 67 (12 pp)
Stamping waste metal, sliding die for, Aug. p. 37 (3 pp)
Screws
Small, production and measurement standardization for, Sept. p. 160 (3 pp)
Small business, technical assistance for, Jan. p. 8 (3 pp)
Soldering, low temperature, carbide tip attachment method, Apr. p. 84
Speeds and feeds for carbide twist drills, Apr. p. 77
Spindles, precision, analysis of, Jan. p. 84 (2½ pp)
Spline rolling, advantages of, Apr. p. 22
Stampings
Assembled for complete units, Apr. p. 87 (4 pp)
Difficult problem solved by, Sept. p. 96 (1 p)
Stamps, rubber, for parts identification, June p. 37 (3½ pp)
Standard units form special stud driving machines, Mar. p. 78 (2 pp)
Standards
Carbide throwaway insert tools for, Feb. p. 79 (2½ pp)
Small screws for, Sept. p. 160 (3 pp)
Steel, stainless, failure of, Mar. p. 55 (½ p)
Stud driving machines, special, from standard units, Mar. p. 78 (2 pp)
Surface plates, determining flatness of, May, p. 69 (4½ pp)
Surfaces
Finish, measurement of, Oct. p. 66 (2½ pp)
Sliding, friction of, July, p. 38 (4 pp)
Technology of this age, Feb. p. 22 (2½ pp)
Testing
Magnetic for heat extraction from quenching media, Sept. p. 55 (3 1/3 pp)
Titanium
Future use of, Aug. p. 35 (1 p)
Hot forming of, Jan. p. 172 (¾ p)
Tools
Jig boring, setup for, Mar. p. 57 (4 pp)
Precision, calibration of, May p. 69 (4½ pp)
Toolmakers' square, Apr. p. 69 (1 p)
Wrenches, torque, for valve assembly, May, p. 62 (1 p)
Torque wrenches
Grinding wheel flanges, safe tightening with, Aug. p. 45 (3 pp)
Valve assembly for, May, p. 62 (1 p)
Training
Effective, pre-requisite for, June, p. 131 (2 pp)
Plastic tooling in, Mar. p. 70 1½ pp)
Trunnion fixture for heavy work handling, Apr. p. 71 (4 pp)
Tubing
Cold bending vs. hot bending, July, p. 48 (3 pp)
Stainless, fixtures for checking contour bends, Sept. p. 170 (1 p)
Valves
Air, for press safety control, July, p. 42 (2¾ pp)
Vibration
Machine, elimination of, Aug. p. 50 (1¾ pp)
Welding
Arc, automatic machines for, Mar. p. 61 (3½ pp)
Automated, for structural steel, Aug. p. 70 (¾ p)
CO_2, for die set construction, Mar. p. 71 (1½ pp)
Fusion and roll planishing, July, p. 122 (2 pp)
Foil butt seam welding process, Sept. p. 70 (½ p)
Mechanized continuous welder, portable, with controlled travel, May, p. 56 (1 p)
Projection for assembly fastening, Apr. p. 90
Spot and seam, for honeycomb fabrication, Jan. p. 73 (4½ pp)
Wheel trueing tools, diamond, special report on, Feb. p. 67 (12 pp); correction of, Mar. p. 69 (1 p)
Wrenches
Torque, for valve assembly, May, p. 62 (1 p)
Torque, tightening grinding wheel flanges with, Aug. p. 45 (3 pp)

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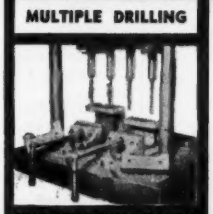
Write for the Commander Production Tool Catalog—contains complete details on the Model 400 and many other cost-cutting tools.

Commander MFG. CO.
4228 WEST KINZIE STREET • CHICAGO 24, ILLINOIS

CIRCLE INFORM-A-GRAM KEY NO. 1371

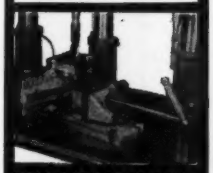
CUT PRODUCTION COSTS 50%

MULTIPLE DRILLING



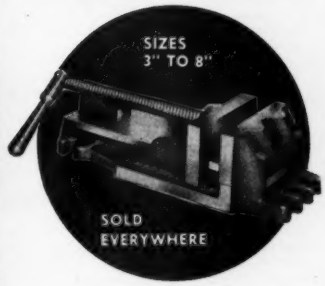
TWO SPEED VISES HANDLE DIFFERENT JOBS AT THE SAME TIME.

LARGE WORK



NEW LARGER MODELS PROVIDE SAME SPEED VISE ECONOMY FOR WORK ON HEAVIER MACHINES.

SPEED VISE



Save 50% on tooling costs with simple, inexpensive jigs in a SPEED VISE. Double your drilling capacity! The cost of the SPEED VISE is very low.

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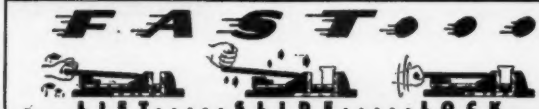

CARDINAL MACHINE CO.
1819 DANA ST • GLENDALE, CALIF. SPEED VISE

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ADVERTISERS' INDEX

Ace Drill Corporation 87
Acme Industrial Co. 76
Acme Tool Corp. 84
Aget Manufacturing Co. 109
Alina Corporation 133
Allegheny Ludlum Steel Corp. 101
The A. K. Allen Co. 126
American Drill Bushing Co. 19
American Optical Co. 42
Ampco Metal, Inc. 47
Armstrong Bros. Tool Co. 118
Atlas Press Company, Clausing Div. 70

The Baj Tool Co. 76
Balas Collet Mfg. Company 142
Bald Eagle Corporation 99
Barber-Colman Co., Hendey Machine Div. 11
Bausch & Lomb Optical Co. 77-88
Bellows Company 3
E. W. Bliss Co. 91
Boice-Crane Co. 128
Buck Tool Co. 112
Bullard Company, The 52
H. L. Bushman Co., Inc. 131

Cadillac Gage Co. 23
Cardinal Machine Co. 137
Challenge Machinery Company 128
Chicago Tool & Engrg. Company 109
Cincinnati Milling Machine Co., The 69
Clausing Div., Atlas Press Co. 70
Cleveland Grinding Machine Co. 38
Cleveland Tool & Die Co. 39
Cleveland Twist Drill Co. 8
Comet Tool Company 110
Commander Mfg. Co. 137
Commercial Filters Corp. 48
Comtor Company 97
Conical Tool Company 124
Lawrence H. Cook, Inc. 103

Danly Machine Specialities 81
Defiance Machine & Tool Co. 114
Delta Power Tool Div., Rockwell Mfg. Co. 24
Detroit Power Screwdriver Co. 129
Detroit Stamping Co. 99-104
Detroit Testing Machine Co. 122
DeVlieg Microbore, Div. DeVlieg Machine Co. 21
The DoAll Company 71
Donley Products, Inc. 97
Durable Punch & Die Co. 85
Durant Tool Supply Co. 123
The Dykem Company 124

Eastern Machine Screw Corp. 132
Eastman Kodak Co. 9
Eisler Engineering Co., Inc. 84
Enco Manufacturing Co. 132
Enterprise Machine Parts Co. 121
Erickson Tool Co. 50

The Federal Press Co. 108
Fenn Manufacturing Co. 16
Firth Sterling, Inc. 72
M. A. Ford Mfg. Co., Inc. 40
Foredom Electric Co. 106
Foster Supplies Company 87-140

Gaertner Scientific Corp 131
Gage Company 103
Galland-Henning Mfg. Co. 46
Gallmeyer & Livingston Co. 129
Genesee Mfg. Co. 118
George Gorton Machine Co. 20
Graphic Systems 126
Greenlee Brothers 100

Hamilton Tool Company 105-107
Hammond Machinery Builders, Inc. 41
Hardinge Brothers, Inc. 17
Harig Mfg. Corp. 18
Heimann Mfg. Company 89
Hendey Machine Div., Barber-Colman Co. 11
Hill Acme Company 32-104
Hi-Shear Rivet Tool Co. 117
Horberg Gage Company 84
Huebner Publications, Inc. 97-137-139
Wm. T. Hutchinson Co. 115

Ideal Industries, Inc. 122
Industrial Tectonics, Inc. 118

Jergens Tool Specialty Co. 110
C. E. Johansson Gage Co. 99
Johnson Mfg. Corp. 125
Jones & Lamson Machine Co. 44

Kenco Mfg. Co 133
Keystone Engineering & Mfg. Co. 114
Kidde Precision Tool Corp. 76-130

Lapeer Mfg. Co. 128
Lepel High Frequency Labs., Inc. 78
Lodding, Incorporated 79
Logan Engineering Company 96
Lucas Milhaupt Engineering Co. 84

ADVERTISING REPRESENTATIVES

CHICAGO 1: Robert R. Pierson, 333 N. Michigan Ave., FRanklin 2-4811

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M. B. I. Export & Import Co., Ltd. 74
Maxwell Industries, Inc. 106
Mead Specialties Company 109
Meehanite Metal Corp. 13
W. F. Meyers Co., Inc. 118
Micrometrical Mfg. Co. 37
Milwaukee Cylinder Co. 124
Modern Manufacturing Co. 110
Moore Special Tool Co., Inc. 28-123
Robert E. Morris Co. 120

National Broach & Machine Co. 5
Niagara Machine & Tool Works 95
A. H. Nilson Machine Co. 49
Northwestern Tools, Inc. 117
The Norton Company 82

Ohio Knife Company 15
O'Neil-Irwin Mfg. Co. 14
Opto-Metric Tools, Inc. 121

Parker-Kalon Div., General American Transportation Corp. 43
Perkins Machine & Gear Co. 115
Perkins Machine Company 29
The Pipe Machinery Co. 27
Portage Machine Co. 30
Precise Products Corp. 134-135
Precision Tool Mfg. Co 110
Procunier Safety Chuck Co. 128
Producto Machine Company 10-99-119
Punch Products Corp. 73

R. B. Tool Co., Inc. 140
Raymond Manufacturing Co. 89
Reid Tool Supply Co. 131
J. A. Richards Company 121
Rivett Lathe & Grinder, Inc. 106
Omer E. Robbins Co. 111
Rockwell Mfg. Co., Delta Power Tool Div. 24

The S-P Manufacturing Corp. 22
Sales Service Machine Tool Co. 98
George Scherr Co. 124-127
Geo. T. Schmidt, Inc. 104
Scully-Jones & Co. 33
Service Machine Company 131
Sheldon Machine Co. 94
Shore Instrument & Mfg. Co. 84
Silber Products, Inc. 103
R. L. Spellman Co. 89
Sperry Products, Inc. 113
Standard Parts Co. 102
Standard Tool Co. 132
Star Stainless Screw Co. 124
Stebar Co. 132
Steel City Testing Machines, Inc. 76
P. A. Sturtevant Co. 116
Superior Steel Products Corp. 35
Sutton Tool Co. 2

The Tannewitz Works 103
Threadwell Tap & Die Co. 127
Thriftmaster Products Corp. 113
Tomco Products Co. 116
Torrington Mfg. Co. 90
Trico Fuse Mfg. Co. 119
Twentieth Century Mfg. Co. 92

United States Diamond Wheel Co. 4
United States Drill Head Co. 109
U. S. Tool Company, Inc. 34
Universal Engineering Co. 31

Valvair Corp. 75
Vascoloy-Ramet Corp. 7
Vernon Devices, Inc. 106
Verson Allsteel Press Co. 141
Vinco Corp. 114
Vulcan Tool Co. 26-89

Wales-Strippit Co. 45
Walls Sales Co. 122
Ward Machinery Co. 117
Wardwell Mfg. Co. 87
Waterbury Farrell Foundry & Machine Co. 93
Watts Brothers Tool Co. 131
Weldon Tool Co. 6
Wells Mfg. Corp. 97
West Point Mfg. Co. 80
Western Tool & Mfg. Co. 121
Wetmore Tool & Engrg. Co. 122
S. B. Whistler & Sons, Inc. 113
Wilton Tool Mfg. Co., Inc. 76

Yoder Company 36

Zagar, Incorporated 86

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Your ad in this issue may help this man . . .

HE'S busy solving a knotty production problem. He may have sent you an inquiry or perhaps he's talking to your representative right now. He's looking for a better way to make a metal part. But that's not unusual. That's his job.

He's always looking for a better way, and a faster and less expensive way, too. He's searching for ideas and information that will help him solve today's problems and eliminate tomorrow's. That's why he reads your ad, and that's why your ad in this issue may help him.

If your product solves his tooling or production problems, or helps him cut the cost of his operations, he's just as anxious to read your ad and buy your product as you are to tell and sell him.

It costs your firm less than a cent and a half to contact this man through a full page ad in TOOLING & PRODUCTION. If you reach him every month he'll find your product when he needs it.

TOOLING & PRODUCTION
Magazine

Contur abrasive discs
STAY ON THE HOLDERS!

IN ACTUAL TESTS ON TITANIUM

"Contur" discs stayed on the holders until discs were worn out.

Adhesive type discs flew off the holders within 15 seconds, due to high friction heat.

All Grits, in sizes: ¾"-1"-1½"-2"-3"-4"

HIGHER GRINDING SPEEDS ✓
SELF CENTERING ✓
SURE LOCKING ✓
LONGER LASTING ✓
TIME SAVING ✓
LOW INITIAL COST ✓

"Contur" flexible abrasive discs provide accurate centering and remain concentric with grinder mandrel at ALL SPEEDS.* They follow the surface grinding cleanly and without gouging flat, convex or concave surfaces.

"Contur" all-metal disc holders are precision-made and will wear indefinitely. Bayonet-locking method and spring-loaded centering pin engage disc for perfect alignment and balance. No wobble, vibration or dangerous fly-offs.

*Operating speeds to 80,000 RPM depending on size.

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1402 Milwaukee Ave., Dept. TP, Chicago 46, Ill.
CIRCLE INFORM-A-GRAM KEY NO. 781

PRECISION BORING BARS
with
SOLID CARBIDE HEADS
Cost No More . . .

than bars with carbide tipped cutting edges. Solid carbide heads and necks (illustrated in black) are not only much more rigid, but have from 3 to 5 times longer tool life. They're ideal for high-precision lathe and jig-boring work.

Immediate Delivery From Stock

Write for complete catalog on Boring Bars, Toolholders, Livecenters, Driving Centers and others.

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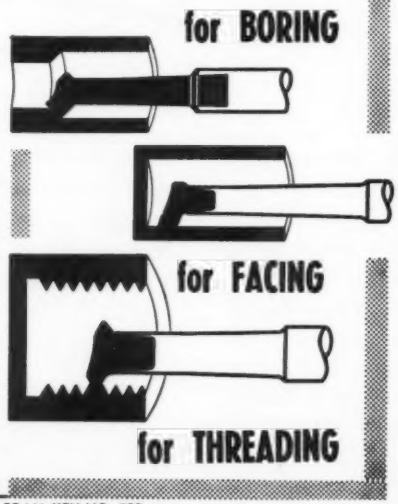
785 NO. BROADWAY WHITE PLAINS, N. Y.



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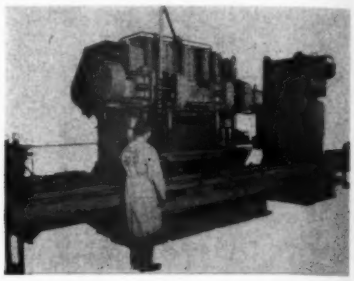
DRILLING AND BORING COMBINED IN NEW UNIT

A drilling and boring machine are combined with a transfer track in a new Moline unit for drilling, core drilling, and finish-boring heavy steel links as they pass along on platen-type workholders.

The drilling machine carries two pairs of spindles on the machine rail; each pair is adjustable from 8"-36" center distance. The various sizes of links are drilled from solid steel at the first spindle pair by drills ranging from 1"-2½" dia. Four quick changes of rpm provide suitable cutting speeds at this station.

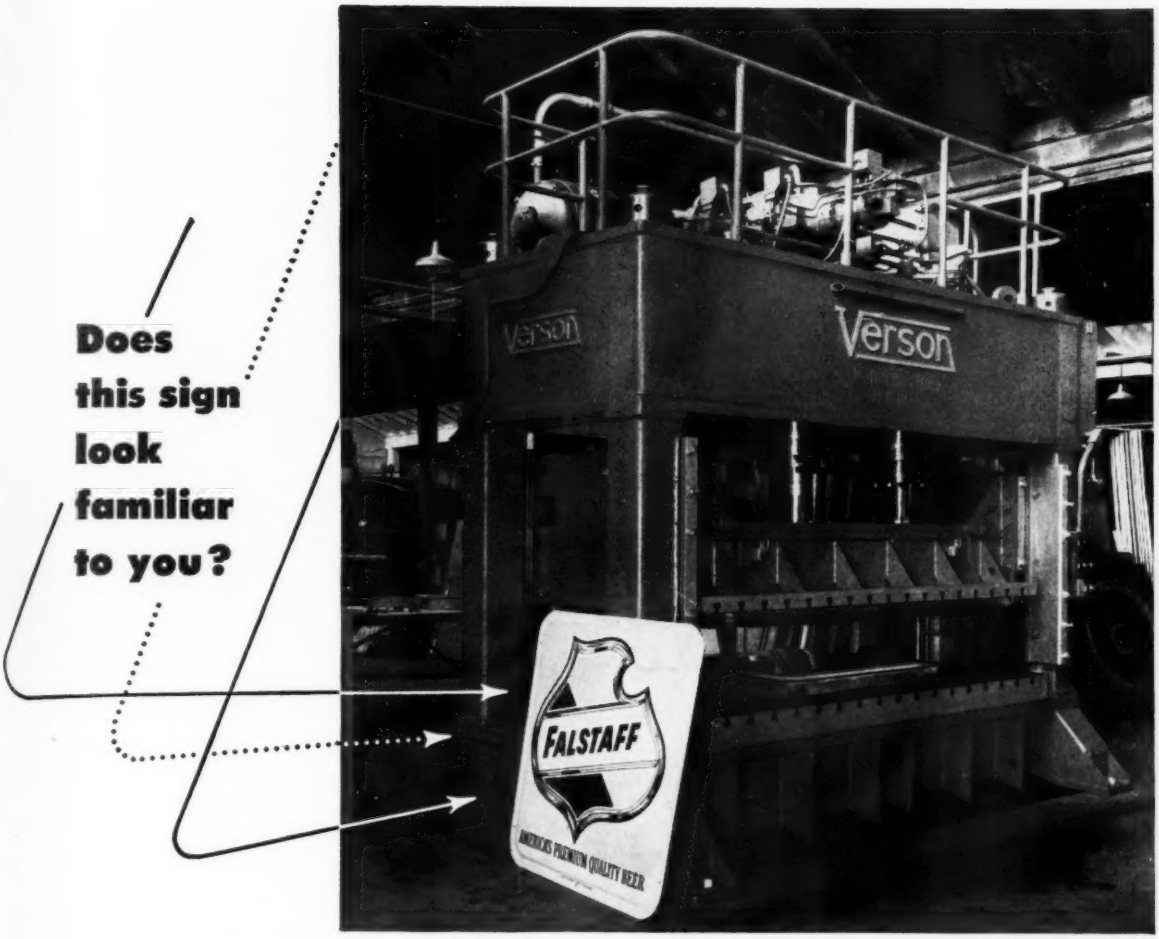


At the second pair of spindles, the previously drilled holes are core drilled to enlarge them to a maximum dia of 3⅜".

At the third station, the drilled holes are finish-bored for accuracy of hole diameters, parallelism, and surface finish. Boring spindles are adjustable for the same center distances as the drilling spindles. The flange-mounted boring bars can be run at 133-400 rpm spindle speeds adjusted by a remotely-controlled, variable speed drive. Pick-off type gears can be changed to increase or decrease the available speeds, although the remote control range remains constant at 3 to 1.

Fixtures on the platens will handle a variety of links. The platens are moved along the transfer track by a power-operated mechanism and are positioned accurately by locating plungers and power clamping. Loading of spindle drive motors and spindle rpm can be read directly from permanently mounted meters. Adjustable guide bushings insure close tolerances for drilling operations, and all tools receive cutting compound from an automatic coolant system.

YOUR INFORM-A-GRAM CARD FOLLOWS PAGE 100 IN THIS ISSUE



GRACE SIGN AND MFG. CO. EMBOSSES FALSTAFF SIGNS WITH THIS VERSON HYDRAULIC PRESS

The Grace Sign and Mfg. Co., St. Louis, Missouri, has been producing quality baked enamel signs for 45 years. An excellent example of their workmanship is a Falstaff Beer sign shown here with the 400 ton Verson Press used to emboss it.

Three background coatings and 5 printed colors are applied to the 22 gauge steel sign blank. The Verson Press, equipped with special rubber dies, then embosses the sign in a domed shape to a depth of 3½ inches. This provides rigidity and produces pleasant color highlights. Use of the rubber dies prevents any damage to the sign finish during embossing.

The press is a three cylinder, shrouded post design with a large platen area, 54″ x 108″. Stroke of the platen is 24″. Bolster area measures 60″ x 108″. Fast advance is 430″ per minute and pressing speed is 39″ per minute. Height of the press is 147″, so designed because of low ceiling height; floor space is 120″ x 137″ and the machine weighs 80,000 pounds.

This hydraulic press is just one of the many types built by Verson . . . manufacturers of presses that daily solve the problems of men throughout the metalworking industry . . . and they can do it for you.

A Verson Press for every job from 60 tons up.

200-C

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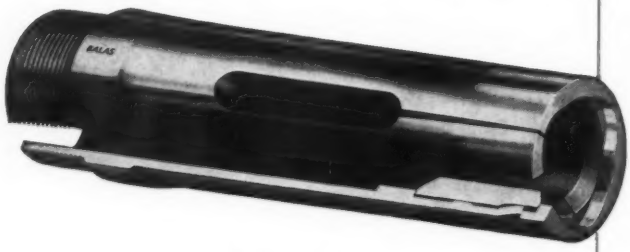

with the

Velvet Touch

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Balas Model "A" Master Pushers have tension tailored to your specifications, light, medium or heavy depending on the type of stock you are using and the speed of your machines. The patented rocking ring provides a floating action on the part of the pad permitting it to follow the exact contour of the stock. This eliminates scratching and scuffing of the stock — reduces loss from scrap.

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For trouble-free feeding on simple or difficult jobs, you'll do better with Balas.

BALAS

CARBIDE PUSHER PADS

Balas Solid Carbide Pusher pads treat your stock gently yet grip firmly. They are non-scratching, non-galling and unless you lose them they will probably last forever. Actual production tests prove that Balas Model "A" Master Pushers with Carbide Pads have turned out more perfect parts for longer periods than any other method. Try them and convince yourself.

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